'68' MICRO JOURNAL

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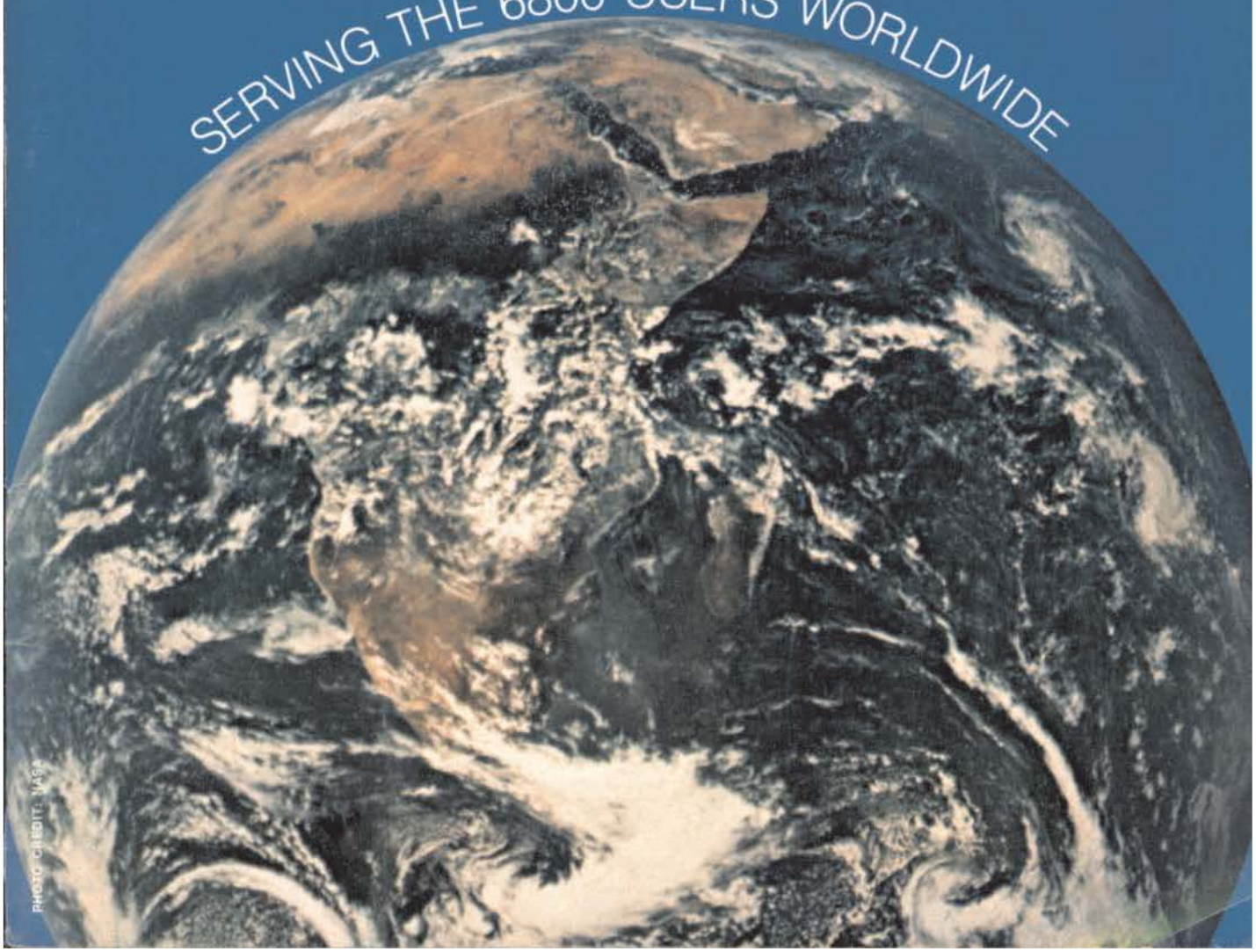
VOLUME II ISSUE 1 • Devoted to the 68XX User • January 1980

"Small Computers Doing Big Things."



SYSTEMS - SOLUTIONS

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- Two central processors with maximum RAM capacities of 56K and 384 K bytes
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Match these to your exact need, add one or more of our intelligent terminals and put together a system from one source with guaranteed compatibility in both software and hardware.

Southwest Technical Products systems give you unmatched power, speed and versatility. They are packaged in custom designed woodgrain finished cabinets. Factory service and support on the entire system and local service is available in many cities.

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The Source for 6800/6809 Software

Technical Systems Consultants, Inc. is The Source for your 6800/6809 systems software needs. From FLEX™, the standard disk operating system of the 680X family, to Sort/Merge, your systems requirements can be filled with the highest quality software in the industry. Nowhere else can you find such variety from a single source. Here are some of the most popular:

Program Name	6800	6809
FLEX for SWTPc	$90	$90
FLEX for SSB	90	90
Extended BASIC	100	100
Extended BASIC Precompiler	50	50
BASIC	65	65
BASIC Precompiler	40	40
FLEX Sort/Merge	75	75
Text Editing System	40	35
Assembler	40	40
Text Processing System	60	N/A
Debug Package	55	75
FLEX Utilities	100	60

These packages are available on either 8" or 5" soft-sectored FLEX diskettes (5" 6800 is FLEX 2.0). Price includes user's manual and object code diskette. Certain programs are available on cassette. Contact Technical Systems Consultants for pricing. All orders should include 3 percent for postage and handling (8 percent on foreign orders). Master Charge and Visa are welcome.

™FLEX is a trademark of Technical Systems Consultants, Inc.

technical systems consultants, inc.
Box 2574, West Lafayette, IN 47906
(317) 463-2502

'68' MICRO JOURNAL

Portions of the text of '68' Micro Journal set using the following:
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San Antonio, TX 78216

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Typography and Color Separations
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Send All Correspondence To:

'68' Micro Journal
3018 Hamill Rd.
PO Box 849
Hixson, Tennessee 37343
— Phone —
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—ITEMS SUBMITTED FOR PUBLICATION—

(Letters to the Editor for Publication) All 'letters to the Editor' should be substantiated by facts. Opinions should be indicated as such. All letters must be signed. We are interested in receiving letters that will benefit or alert our readers. Praise as well as gripes is always good subject matter. Your name may be withheld upon request. If you have had a good experience with a 6800 vendor please put it in a letter. If the experience was bad put that in a letter also. Remember, if you tell us who they are then it is only fair that your name 'not' be withheld. This means that all letters published, of a critical nature, cannot have a name withheld. We will attempt to publish 'verbatim' letters that are composed using 'good taste.' We reserve the right to define (for '68' Micro) what constitutes 'good taste.'

(Articles and items submitted for publication) Please, always include your full name, address, and telephone number. Date and number all sheets. TYPE them if you can, poorly handwritten copy is sometimes the difference between go, no-go. All items should be on 8X11 inch, white paper. Most all art work will be reproduced photographically, this includes all listings, diagrams and other non-text material. All typewritten copy should be done with a NEW RIBBON. All hand drawn art should be black on white paper. Please no hand written code items over 50 bytes. Neatly typed copy will be directly reproduced. Column width should be 3¼ inches.

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WHAT THE  IS GIMIX UP TO?

Dear Users:

To bring you up to date —

EXPORT MODELS — We now have a 115/230 volt 50Hz power supply for foreign use, identical in output to our 60Hz model. This export power supply provides: 8 volts at 25 amps and + and − 16 volts at 5 amps each, and operates at full load over input ranges of 90 to 140/190 to 240 volts, 50Hz A.C.

All export systems are fully burned in and tested, using an in house 50Hz power system, to insure reliability and longevity.

Note: Since the GIMIX power supplies use ferro-resonant transformers, it is important that they be connected to only the same frequency current as they are designed for.

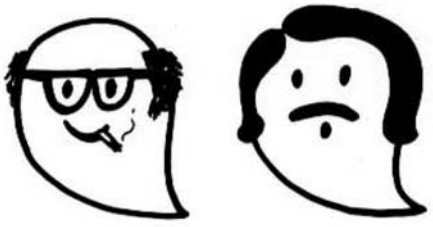
We have designed a 6809 CPU CARD, that will have provisions for: time of day clock with battery backup, 6840 programmable timer, 9511/12 arithmetic processor, 1K of RAM, PROM sockets capable of accepting 1K to 8K PROMS/ROMS, flexible decoding, multiple processor clock speeds, and a unique choice of memory management techniques. It will be versatile, and compatible with existing 6809 hardware and software, including SWTPs. Shipments should begin sometime in March.

The prototype for a high resolution BIT MAP GRAPHICS board set is now undergoing final testing. It will be available in various formats up to a maximum of 512 x 512. It will have the capability for RBG color by linking multiple boards. We hope to start shipping in February 1980.

An 8 PORT 50 PIN SERIAL CARD — that uses 6850s, is RS232 compatible, (with handshake lines), can use 6809 SS50C extended address lines, and has an optional, on-board baud rate generator, should be available by February 1980.

Rumor has it that in Philadelphia in October there was something exciting "floating" around in a GHOSTly black bag. Some got a glimpse of it, some saw it work. Now its here for all to see — Just turn the page.

Best Regards from all the
GHOSTS at **GIMIX**



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THE FIRST AND ONLY 32K STATIC RAM BOARD...

NEW!

Designed for use with: ★ Existing SS50 Systems
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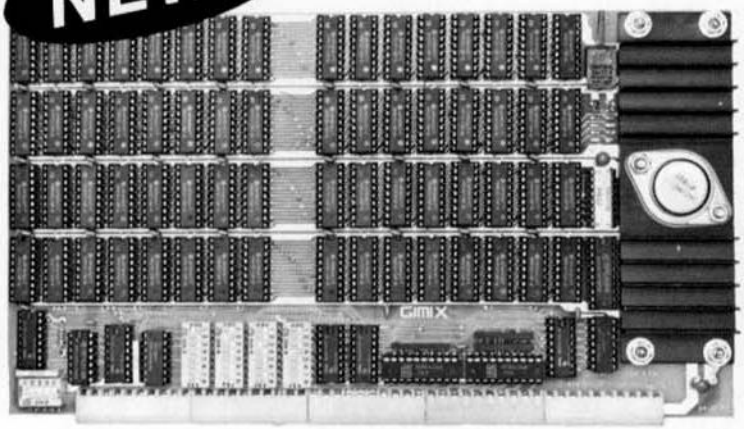

FEATURES:

- Decoding for 4 Extended Address Lines (allows memory decoding up to 1 megabyte)
- DIP-switch to set extended addressing or disable it
- 4 separate 8K blocks, addressable to any 8K boundary by DIP-switch
- Each 8K block may be individually disabled
- Write protect either of two 16K sections
- Low power consumption — uses 2114L low power RAMS — (2 amps typical for 32K)
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- Gold Bus Connectors

Assembled, Burned In and Tested at 2MHz.

16K . . . . . $328.12 24K . . . . . $438.14 32K $548.15

16K and 24K Versions are socketed for 32K and require only additional 2114S for expansion.

FACTORY PRIME STATIC RAMS

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★ Upper and Lower Case with Descenders ★ Hardware Scrolling
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It is the ***ONLY*** **Video Board** that gives you:

- A user programmable RAM character generator. Custom character sets, up to 128 characters each, can be stored and loaded into the board ***under software control,*** from disk, tape, etc.
- The ability to choose, ***under software control,*** 256 displayable characters from 384 available in the 3 on board (2 EPROM and 1 RAM) character generators.
- The ability to divide the 256 displayable characters into 8 groups, according to ***both*** ASCII Code and bit 8; lets your program determine how each group is displayed. (Which character generator to use, and whether it will be normal or inverse video, full or reduced intensity or a combination of these.)
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- The ability to control all these features, on the fly, through software.

Fully decoded, occupies only 2K of address space.
Fully socketed — Gold bus connectors.
Assembled, Burned in, and Tested at 2MHz.

Deluxe Version with RAM Character Generator **$458.76**
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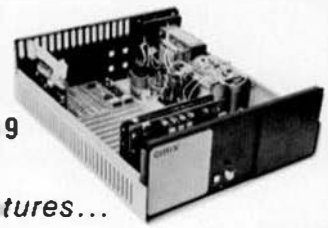
64 or 32 x 16 Video Board . . . **$198.71**



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Includes: Chassis, 6800 CPU, 32K RAM Board, Choice of I/O Card.

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- Ferro-Resonant Power Supply (+8V at 25 Amps, + and − 16V at 5 Amps each.)
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Phone, write, or see your dealer for details and prices on our broad range of Boards and Systems for the SS50/SS50C bus and our AC Power Control Products for all computers.

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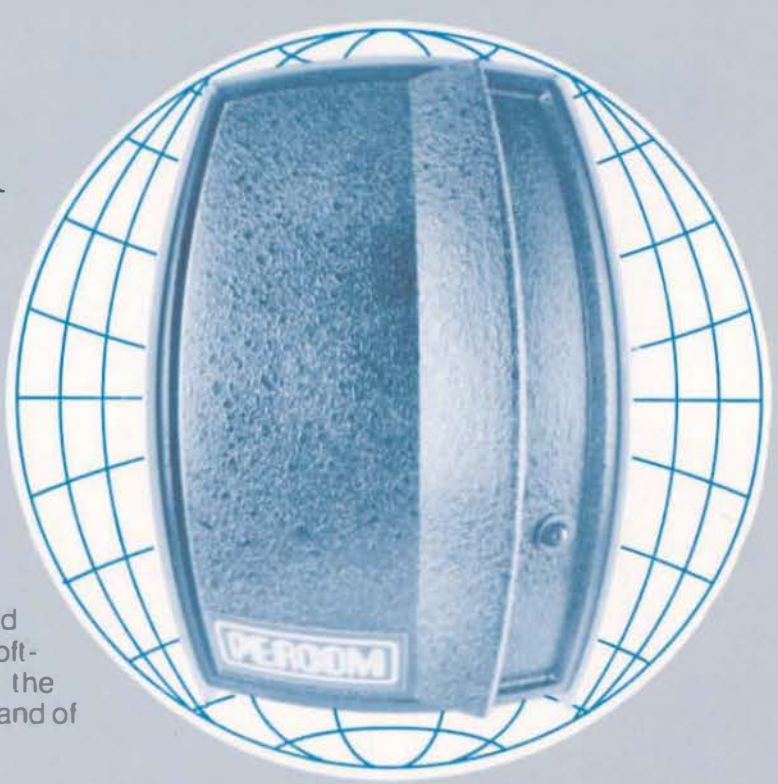
SEE GHOST AD PAGES 38 & 43

In the world of 6800 Microcomputing there is only one Universal Mini-Disk System . . .

the PERCOM LFD-400 ™ with SOFTRAN ™



Made possible by SOFTRAN™, an innovative $24.95 translator program, the reliable Percom LFD-400™ has just been upgraded to the first universal mini-disk storage system.

Suddenly the two worlds of 6800 minidiskette software become one. Because the LFD-400™ with SOFTRAN™ can read either soft-sectored or hard-sectored disks.

And owning an LFD-400/SOFTRAN system means you can run minidiskette programs from the enormous combined selection of all of the principal 6800 software houses — TSC, Computerware, the Software Works, Hemenway Associates and of course Percom.

Available in versions for mini FLEX†, FLEX 2.0† and Smoke Signal Broadcasting Company's DOS, SOFTRAN™ copies soft-sectored minidiskettes track-for-track onto hard-sectored minidiskettes. If the source disk includes a FLEX† or 'Smoke' DOS, SOFTRAN™ is used to modify the operating system to function with the Percom LFD-400™.

SOFTRAN™ is supplied on a minidiskette along with utilities for only $24.95. A users manual is included. You must indicate whether SOFTRAN™ is to be used for mini FLEX†, FLEX 2.0† or Smoke's DOS.

The Percom LFD-400™ mini-disk system sells for only $599.95, complete with: (1) the drive, drive electronics and Percom's rugged PS-401 power supply all in a finished enclosure, (2) a demonstrably superior controller PC card featuring an explicit data/ clock separation circuit, MPX, a remarkable 2K DOS, and provision for 1K extra PROM, (3) an interconnecting cable and (4) a 70-page users manual.

Also available: Upgrade kits for SWTP or 'Smoke' mini-disk drive systems. Kit includes LFD-400™ controller, MPX DOS & SOFTRAN™. Only $224.95.

Available soon!
SOFTRAN™ for Percom's 77-track LFD-800™ mini-disk system; SOFTRAN/9™ for 6809 FLEX† files and programs.

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† trademark of Technical Systems Consultants, Inc.

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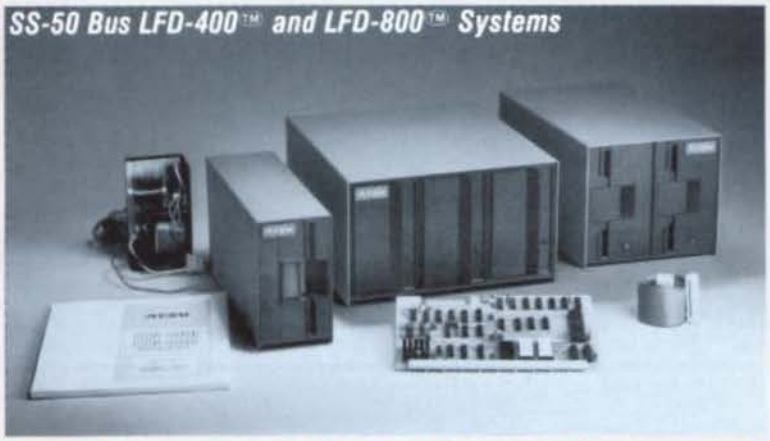

SS-50 Bus LFD-400™ and LFD-800™ Systems

Each LFD mini-disk storage system includes:

- drives with integral power supplies in an enamel-finished enclosure
- a controller/interface with ROM operating system plus extra ROM capacity
- an interconnecting cable
- a comprehensive 80-page users manual

Low-Cost Mini-Disk Storage in the Size You Want.

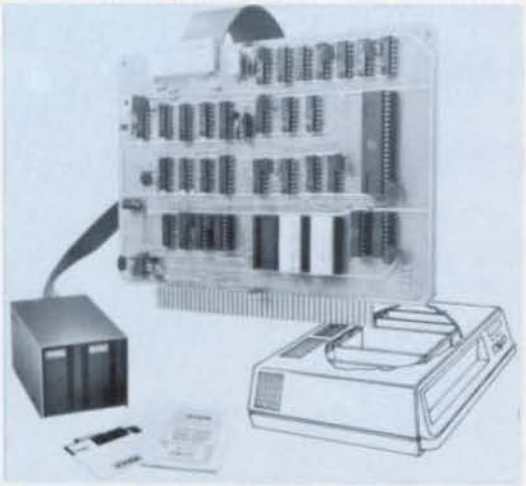
Percom LFD mini-disk drive systems are supplied complete and ready to plug in the moment they arrive. You don't even have to buy extra memory. Moreover, software support ra ges from assembly language program development aids to high-speed disk operating systems and business application programs.

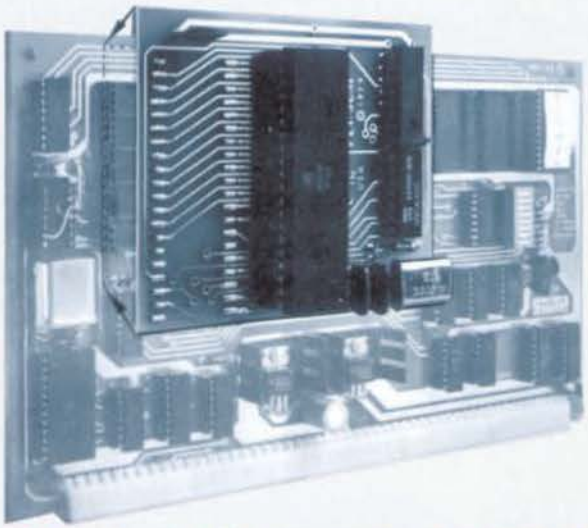
The LFD-400™ and -400EX™ systems and the LFD-800™ and -800EX™ systems are available in 1-, 2- and 3-drive configurations. The -400, -400EX drives store 102K bytes of formatted data on 40-track disks, and data may be stored on either surface of a disk. The -800, -800EX drives store 200K bytes of formatted data on 77-track disks.

The LFD-1000™ systems (not pictured) have dual-drive units which store 800K bytes on-line. The LFD-1000™ controller accommodates two drive systems so that a user may have as much as 1.6M bytes on-line.

Mini-disk storage system prices:

MODEL	1-DRIVE SYSTEM	2-DRIVE SYSTEM	3-DRIVE SYSTEM
For the SS-50 Bus:			
LFD-400™	$ 599.95	$ 999.95	$1399.95
LFD-800™	895.95	1549.95	2195.95
For the EXORciser® Bus:			
LFD-400EX™	$ 649.95	$1049.95	$1449.95
LFD-800EX™	945.95	1599.95	2245.95
LFD-1000™	(dual) $2495.00	(quad) $4950.00	—


EXORciser® Bus LFD-400EX™ -800EX™ Systems



Upgrade to 6809 Computing Power. Only $69.95

Although designed with the SWTP 6800 owner in mind, this upgrade adapter may also be used with most other 6800 and 6802 MPUs. The adapter is supplied assembled and tested, and includes the 6809 IC, a crystal, other essential components and user instructions. Restore your original system by merely unplugging the adapter and a wire-jumpered DIP header, and re-inserting the original components. Also available for your upgraded system is PSYMON™ (Percom SYstem MONitor), the operating system for the Percom 6809 single-board computer. PSYMON™ on 2716 ROM costs only $69.95. On diskette (source and object files), only $29.95.

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- Interface to data terminal and two cassette recorders with a unit only 1/10 the size of SWTP's AC-30.
- Select 30, 60 or 120 bytes per second cassette interfacing; 300, 600 or 1200 baud data terminal interfacing.
- Optional mod kits make CIS-30+ work with any microcomputer. (For MITS 680b, ask for Tech Memo TM-CIS-30+-09.)
- KC Standard/Bi-Phase-M (double frequency) cassette data encoding. Dependable self-clocking operation.
- Ordinary functions may be accomplished with 6800 MikBug® monitor

Prices: Kit, $79.95. Assembled, $99.95. Prices include a comprehensive instruction manual. Also available: Test Cassette, Remote Control Kit (for program control of recorders), IC Socket Kit, MITS 680b mod documentation and Universal Adapter Kit (converts CIS-30+ for use with any computer).

of 6800 Microcomputing.

6800/6809 SOFTWARE

System Software

6800 Symbolic Assembler — Specify assembly options at time of assembly with this symbolic assembler. Source listing on diskette $29.95

Super BASIC — a 12K extended random access disk BASIC for the 6800 and 6809. Supports 44 commands and 31 functions. Interprets programs written in both SWTP 8K BASIC (versions 2.0, 2.2 & 2.3) and Super BASIC. Features: 9-digit BCD arithmetic, Print Using and Linput commands, and much more. Price $49.95

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Operating Systems

INDEX™ — This easy-to-use disk-operating and file management system for 6800 microcomputers is fast. I/O devices are serviced by interrupt request. INDEX™ accesses peripherals the same as disk files — new devices may be added without changing the operating system. Other features: unlimited number of DOS commands may be added - over 60 system entry points - display only those files at or above user-specified file activity level - versions available for SWTP MF-68, Smoke's BFD-68 and Motorola's EXORciser*. Price $99.95

MINIDOS-PLUSX™ — An extension of the original MINIDOS™ for LFD-400™ mini-disk systems, MINIDOS-PLUSX™ manipulates files by six-character names. Supports up to 31 files. Resident commands include Initialize, Save, Allocate, Load, Files (directory list), Rename and Delete. Supplied on 2708 ROM with a minidiskette that includes transient utilities such as Copy, Backup, Create, Pack and Print Directory. Price ..... $34.95.

PSYMON™ — Percom SYstem MONitor for the Percom single-board/SS-50-bus-compatible 6809 computer accommodates user's application programs with any mix of peripherals without modifying programs. PSYMON™ also features character echoing to devices other than the communicating device, sophisticated register and memory dump routines and more. Price (on 2716 ROM) ..... $69.95.

WINDEX™ — Described in detail elsewhere on this page.

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General Ledger — For 6800/6809 computers using Percom LFD mini-disk storage systems. Requires little or no knowledge of bookkeeping because the operator is prompted with non-technical questions during data entry. General Ledger updates account balances immediately — in real time, and will print financial statements immediately after journal entries. User selects and assigns own account numbers; tailors financial statements to firm's particular needs. Provides audit trail. Runs under Percom Super BASIC. Requires 24K bytes of RAM. Supplied on minidiskette with a comprehensive users manual. Price ..... $199.95.

FINDER™ — This general purpose data base manager is written in Percom Super BASIC. Works with 6800/6809 computers using Percom LFD-400™ mini-disk drive storage systems. FINDER™ allows user to define and access records using his own terminology — customize file structures to specific needs. Basic commands are New, Change, Delete, Find and Pack. Add up to three user-defined commands. FINDER plus Super BASIC require 24K bytes of RAM. Supplied on minidiskette with a users manual. Price $99.95

Mailing List Processor — Powerful search, sort, create and update capability plus ability to store 700 addresses per minidiskette make this list processor efficient and easy to use. Runs under Percom Super BASIC. Requires 24K bytes of RAM. Supplied on minidiskette with a users manual. Price $99.95.

From the Software Works

Development and debugging programs for 6800 µCs on diskette:

Disassembler/Source Generator	$30.95
Reloc'ting Disas'mbly/Segmented Text Gen	$40.95
Disassembler/Trace	$25.95
Support Relocator Program	$25.95
Relocating Assembler/Linking Loader	$55.95
SmithBUG** (2716 EPROM)	$70.00

½-Price Special on Hemenway Software!

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MACRO-Relocating Assembler	$ 39.97
Linkage Editor (LNKEDT68)	$ 24.97
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And 'looking into' is just what you do with the Electric Window™ as you peer right into memory space where characters are being input and manipulated. Display is memory-resident, programmable and generates up to 24 80-character lines.

Other features include:

- standard character generator plus provision for optional special character generator
- dual intensity, high-lighting alphanumeric display
- scrolling by a programmable register • programmable display positioning
- programmable interlaced or non-interlaced scan
- descenders on lower case letters • users manual with application instructions and listing of WINDEX™ driver.

The Electric Window.™ Worth Looking Into. $249.95

WINDEX™ is a fast video display driver program for the Electric Window™. WINDEX™ also features: program and keyboard control of character generators • displayable control characters — under program control • automatic scrolling • a driver routine for the parallel input keyboard feature of the Percom 6809 Single-Board Computer, the SBC/9™ • auto-linking to PSYMON™, the ROM operating system for the SBC/9™ • Prices: ROM version: $39.95; LFD-400™ compatible diskette (source and object files): $29.95.

Now Available! the SBC/9™ MPU/Control Compute

(Single-Board-Computer/6809) — stands alone as a control computer, but also compatible with the SS-50 bus for use as an MPU card. Includes PSYMON™ (Percom SYstem MONitor) in a 1K ROM and provides for additional 1K of ROM. Also includes 1K of RAM. Features: Super Port — provision for multi-address, 8-bit bidirectional data lines • an intelligent data bus for multi-level data bus decoding • an on-board 110-baud to 19.2 kbaud clock generator • extended address capability — to 16 megabytes — without disabling baud clock or adding hardware. And much more. Supplied with PSYMON™ and comprehensive users manual. Price $199.95

See full page ad elsewhere in this magazine for all of the SBC/9™ features.

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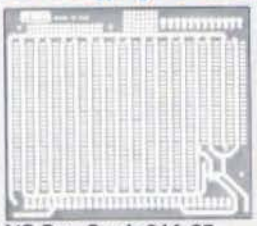
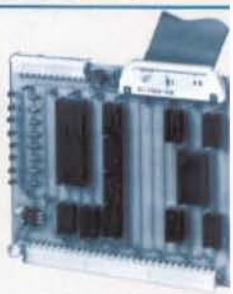
All of the features needed for rapid, straighforward circuit prototyping. Use 14-, 16-, 24- and 40-pin DIP sockets • SS-50 bus card accommodates 34- and 50-pin ribbon connectors on top edge, 10-pin Molex connector on side edge • I/O card accommodates 34-pin ribbon connector and 12-pin Molex on top edge





I/O Bus Card: $14.95

SS-50 Bus Card: $24.95

- I/O card is 1-¼ inches higher than SWTP I/O card • interdigitated power conductors • contacts for power regulator and distributed capacitance bypassing • use wire wrap, wiring pencil or solder wiring • tin-lead plating over 2-oz copper conductors wets quickly, solders easily • FR4-G10 epoxy-glass substrate.

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4th-10th 1 year extension 68 Micro Journal™

The software must be applications, utilities or serious software, of original design, to operate with the following CATEGORIES:

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TSC FLEX	6800 Disk System FLEX Ver. 2.0 5"
TSC FLEX	6800 Disk System Ver. 1.0 8"
TSC FLEX	6809 Disk System Ver. 09 5" or 8"
SSB	Dos Version 5
SSB	Dos Version 4 or earlier
SSB	TSC FLEX Version
PERCOM	INDEX
PERCOM	MiniDos+
HEMENWAY	CP/68 Disk System
MSI	Disk Operating Systems
SOFTWARE DYNAMICS	SDOS
JPC	TC-3 Cassette System
ANY	KC Standard Tape System
BASIC	Any 6800 Version
BASIC	Any 6809 Version

There are sixteen (16) categories, as indicated above. In addition we have other prizes donated by various vendors of 6800/09 products. As of the 15th of November 1979 over $13,000.00 in prizes has been pledged.

GIMIX - Mainframe, value $829.00.

SOUTHWEST TECHNICAL PRODUCTS CORP (SWTPC) Computer 69/8, value $595.00.

DIGITAL RESEARCH: COMPUTERS, 16K static memory board kit, value $295.00.

JPC PRODUCTS, TC-3 kit w/CFM-3 package; AD-16 kit; CK7 kit, total value $190.00.

STAR-KITS, Set checkbook balancing software : MiniFLEX™ or PERCOM Super BASIC on disk, value $40.00.

MICROWARE Systems Corp, Package 1 each: ABASIC Compiler, ABASIC Source Gen., ABASIC Interpreter, LISP Interpreter; also 6 each RT/68 ROM OS and 6 each 6800 Chess programs. Total value $1,005.00.

SMOKE SIGNAL BROADCASTING, two $500.00 gift certificates for any SSB product. Categories eligible SSB DOS Ver. 4 or earlier and Ver. 5 or later; total value $1,000.00.

LUCIDATA, 5 each PASCAL Ver. 2, 1 to each FLEX™ category. Total value $750.00.

COMPUTERWARE, 2 each $200.00 gift certificates for any Computerware software product. 1 gift certificate for best of SSB disk BASIC and 1 gift certificate for best of Computerware's Random BASIC. Total value, $400.00.

SSI, Schreier Software Index, choice of $100.00 of SSI software.

SOFTWARE DYNAMICS, 6800 BASIC Compiler, value $350.00.

The MICRO WORKS, choice of any one item, value up to $179.95.

HEMENWAY ASSOCIATES, INC., Books, 3 each CP/68, 3 each XA6809 Macro Cross Assembler, 3 each STRUBAL+ Compiler, total value $329.55.

CER-COMP Microcomputers, MiniDisk+ Disk system (EPROM) and software on disk. Total value $89.00.

TECHNICAL SYSTEMS CONSULTANTS (TSC), $250.00 choice of any TSC software, for best of FLEX™ entries.

HHH Enterprises and Springbok Digitronics, SPIRIT (disk SSB) and a copy of STD-1, these will be awarded for best of SSB DOS. Value $110.00.

Final decision shall be delegated to a panel of judges selected by the staff of 68 Micro Journal™. All judges decisions are final and each person submitting, shall by his or her submitting material for evaluation, acknowledge that they agree to abide by any and all rules of this contest, as published within the pages of 68 Micro Journal™.

Programs and material submitted shall be judged on the basis of good and workable software. By this we mean, it should do something useful and be needed by the average 6800/09 user in the particular category. Size is of little importance, the most important consideration will be how useful it is.

All material submitted shall remain the property of the original owner (who should be the author). Each submission shall contain a paragraph that states the material submitted is of original design and the property of the person in whose name it is submitted.

It shall be understood that regardless of who wins or does not win a prize, all material submitted shall be authorized and eligible, to be published by 68 Micro Journal™. Material published, which was not a winning entry, shall gain the author an extension to his or her subscription. Anyone may enter and it is not a requirement that the person submitting material be a subscriber to 68 Micro Journal™. Prizes will be awarded on the quality of the material submitted and being or not being a subscriber, will have no bearing.

Authors should indicate that the material has NOT been previously published in any commercial magazine or journal (club newsletters and the like do not count as a commercial magazine or journal).

I have tried to keep the rules simple. This should encourage the maximum participation in the contest. This is another of the ways that we attempt to secure good material for the sole benefit of our readers. Also I believe that it will encourage those who have developed good software, to share with his or her fellow 6800/09 users. By sharing we all profit. By working together, as has been in the past, it enables us as 6800/09 user to have a magazine that is just for us.

NOTE: Due to the large amount of material being submitted, the contest will be extended for an additional 90 days (February to May). The prime consideration of this contest is not time but good software. By this extension we can include some excellent software, nearing completion, that we would otherwise miss making available to our readers.

ALL ENTRIES NOTIFIED AS FINAL PRIZE WINNING ENTRIES WILL BE REQUIRED TO SUBMIT MATERIAL (IN SOURCE AND BINARY) ON MEDIA OF CATEGORY USED. This will allow the judges to assemble and run all winning programs, as submitted.

All entries should be plainly marked 'CONTEST'!!! Also we are receiving contest entries without sufficient documentation. We MUST have "GOOD DOCUMENTATION" for each submission. Please include as much documentation as you can. Failure to comply with the above may preclude some fine software from being fully considered. The above I cannot overstress!!!!!!

Dale Puckett
14753 Endsley
Woodbridge, VA 22193

Spirit-a New Language

If you are looking for a language that will allow you to do systems language programming without sweating everything out at the assembly language level, look no further. SPIRIT is here.

SPIRIT was written by David Lissiuk for Springbok Digitronics and is sold by H H H Enterprises, Box 493, Laurel, Md. 20810. It is available on either 5 or 8-inch Smoke Signal Broadcasting disk and comes with an especially slick hardcover notebook. It sells for $69.95

If you've noticed the SPIRIT ads here in '68' Micro Journal and are wondering what it is all about, we'll try to help in this review.

Lissiuk calls SPIRIT a general purpose programming system. It has features found in compilers, editors, debuggers, loaders and operating systems--all within a single architcture. It is just under 9K decimal bytes long at startup, loading from 42H to 2245H.

One of the most important features of SPIRIT is that it is what Lissiuk calls "extensible." This means that the user can define new system functions in terms of functions already available in the dictionary. SPIRIT compiles these new definitions immediately and they may be used immediately after they are defined.

For readers tuned in to the history of programming languages, SPIRIT is based on STOIC which was developed by J. Sachs. STOIC, itself was based on FORTH which was developed by C. H. Moore.

IT'S FOR SYSTEMS PROGRAMMING

One important point a potential purchaser should consider is that SPIRIT is designed as a higher level language for use by a systems level programmer. It gives the programmer capabilities he has only had before in assembly language. And, with SPIRIT the development time is much shorter. Lissiuk claims to have used SPIRIT in projects ranging from real-time control to handling disk copies of non-standard diskettes. I'll believe it. The language appears to be extremely powerful.

The disk comes with five example programs which illustrate the use of the language. These examples, most of which Lissiuk says he wrote in 10 or 15 minutes, are amazing. VIEW.SPR, a simulation of the Smoke Signal Broadcasting VIEW.$ utility is barely two thirds of a page long. And, two thirds of the text are remarks. The actual program itself is one line long. That line contains only 11 words, four of which were defined in earlier lines. The remainder of the necessary words were already in the dictionary.

Beware however, SPIRIT is blindly obedient to every command. The introduction file on the disk says it will "jump out the window the very first time you tell it to as it will follow your orders exactly, expecting the programmer to furnish the intelligence." It's the truth. I caused it to jump into never-never land several times before I got the hang of it, but after about an hour all went well.

A word is in order here about the documentation. With a few minor exceptions it is extremely well written. It is packaged with a great touch of class.

CONFIGURING THE SYSTEM

When I fired up the system the first time it didn't run. I looked at the well documented memory map in the notebook, checked an address or two and found out that the version on the disk was set up to run with a DOS at $7000 and a MIKBUG monitor with a PIA at $8004. Ah so, I said, my DOS is at $D000, my monitor is SWATBUG and I use an ACIA. No sweat, I changed the jumps and pointers, saved another copy and it ran the first time. Well, almost the first time. I had to go back and change the break routine to work with an ACIA and change the echo routine to work with SWATBUG.

After I got it working I LOADed VIEW.SPR, ran it and started reading the .TXT files on the disk. One of the files, CONFIG.TXT told me exactly how to configure SPIRIT to run on any system. I wouldn't even of had to use the memory map to figure it out. CONFIG.TXT then describes files which can be appended to SPIRIT.$ to make it automatically configure itself to almost any system. I say almost any system because all of the supplied files are set up with an ACIA at $8008. I don't really understand why the SWATBUG and MIKBUG overlays are set up this way since they are both designed to address their hardware at $8004. Maybe it was an oversight since I believe SMARTBUG uses $8008 for its ACIA. Anyway, the moral of the story is--if all else fails, read the directions.

Seriously, the documentation is very easy to use and just for the fun of it, I had SPIRIT talking to FLEX. At least on the I/O level. I did not have time to transfer the .TXT files over to FLEX and see if they would load and run but since I had it doing everything else I'll bet the diehard experimenter could get it running with FLEX with no trouble at all. In fact, I think I'll try it when I get time.

SOME DEFINITIONS

Turning now toward basic definitions, SPIRIT is composed of three parts: a system which handles communication with the operating system; a KERNEL which implements all of the systems primitive functions; and a WORKSPACE which holds all stacks, user variables, and user definitions.

SYNTAX

SPIRIT's syntax is fairly simple. A command line is made up of a sequence of literals or names of words separated by spaces and ending with a carriage return. To program in SPIRIT you merely define new words based on words that already exist in the vocabulary.

Lissiuk states that the syntax is EXTREMELY simple. I disagree here because the language uses REVERSE POLISH NOTATION for all operations. For those unfamiliar with RPN, this means that all operands are entered, followed by the operators. No parentheses are necessary as in algebraic languages.

Here's an example. In RPN to add 3 and 3 you type "3 3 + =".

Here's another example. One of the basic words in SPIRIT is "@". Used in at statement it might look like this:

$7100 @ 4HEX.

If you enter this statement SPIRIT will immediately print the 16 bit, four digit hex number that is stored at address $7100. The easy way to understand what is happening is to read the line backwards from right to left. Approaching it this way you can say to yourself in English, "give me the four hex digits that are stored at $7100." If I approach SPIRIT programs in this manner, I find them a whole lot easier to understand.

There is a problem however, since some of the words are executed directy, ie, to output a carriage return and linefeed, you simply type CRLF. If you want the CRLF before the the four hex digits in the example program line above, you must type the CRLF first. Needless to say, you can confuse yourself until you really master the language.

COMMENTS

Comments may be added to SPIRIT programs by using a special word, "3". When the system sees a 3 it does not compile the remainder of the line, thus the programmer can add as many comments as necessary to make the program readable.

The word length of the present SPIRIT version is 16 bits, thus math work is limited to a range from 0 to 65535 if unsigned numbers are used and -32768 to +32767 if numbers are signed. This is probably not a major limitation however since the type of work a systems programmer would be involved in probably wouldn't require floating point math, etc.

On the positive side SPIRIT can handle numbers in four different bases, a feature which is extremely useful. The bases may be changed by using the words BIN, OCTAL, DECI, and HEX. On cold start the system comes up with base 10 or decimal numbers as the base.

AN EXAMPLE

Here's a very short program to illustrate a few SPIRIT functions. Remember how much code it takes to convert number bases in BASIC? Take a look at this:

```
'MSG1 : "€ ENTER A HEX NUMBER: " MSG ;
'MSG2 : CR 4HEX " IN BINARY IS = " MSG ;
'IN : HEX MSG1 INNUM DUP MSG2 ;
'OT : IN BIN <> TYPE DECI ;
```

The code above creates a program with the name, OT. To execute that program you simply type OT after the prompt.

How does it work? OT first calls the word IN which is defined on the third line. When IN is called it sets the system RADIX to the base 16 or HEX. Then, it calls the word MSG1 defined in the first line. MSG1 simply prints the words, ENTER A HEX NUMBER:. After the message is printed IN calls the word INNUM which was already defined in the KERNAL. INNUM inputs a number in a base specified by the RADIX which the word HEX has set to base 16. In other words, it is looking for a hexidecimal word. IN then goes on to call the word DUP which duplicates the top of the stack. It then calls MSG2 which outputs a carriage return followed by the four digit hex number which was input, followed by the message IN BINARY IS =. At this point we return to Program OT where we execute the word BIN. This word converts the system RADIX to binary. The word <> is a special input/output operator which converts a number on the stack to an ASCII string. The word TYPE then types the binary number and finally, DECI converts the RADIX back to base 10 or decimal. Believe it or not you have accomplished a whole lot of programming in a very few short words.

You probably noticed that the syntax for describing new words is very simple. You start by typing a single quote and the new word you wish to define. This word may be up to 127 characters long but must not contain carriage returns, form-feeds, or other special control characters. A delimiter (usually a space) follows the new word. Then after the colon a series of words are typed which define the characteristics of the new word. These words must have been defined previously. Finally, after the last word is typed a semi-colon finishes the definition.

Here's another example:

```
'PRINT-HELLO : CR " HELLO " MSG ;
```

This program will print the word HELLO on the terminal. Here's another short one.

```
'AVERAGE : + 2/ ;
```

Now, if you type two numerical operands followed by the word AVERAGE, you will get the average of the two numbers. In other words if you enter "2 4 AVERAGE =", the answer "3" will be typed on the terminal. Amazing.

ONE LINE EDITOR

If you own an ADM-3 terminal, you have it made. SPIRIT as delivered is set up to fully utilize the cursor addressing capabilities of that terminal. With the one line editor you can accomplish just about any editing function. A few include: Delete the last character, delete the last word, delete the entire buffer, print the next character, print the next word, etc.

If you do not own an ADM-3 you can run a program on the disk called MODIFY.SPR and change the editing control characters to match your terminal.

A SMALL "BIG" EXAMPLE

Here is the one line VIEW program I mentioned earlier.

```
'VIEW : CLEAR FILE EQZ IF NUMBER CR READ DROP
THEN DERR DCLOSE ;
```

FILE, NUMBER, READ, DERR are defined in the program earlier. The rest are already in the KERNEL. CLEAR simply clears the CRT screen. FILE prompts for the filename and opens the file. EQZ checks to see if the file was opened without errors. IF is a system conditional. NUMBER simply counts the lines that have been output to the CRT. CR outputs a carriage return. READ reads a character from the disk. DROP discards the top of the stack. DERR is a routine to report any errors. And finally, DCLOSE is a system function which closes a disk file.

There you have a one line SPIRIT program which emulates a two or three page assembly language program.

CONCLUSIONS

SPIRIT is relatively simple to use. For example to load a SPIRIT program from a disk you type, LOAD. LOAD will prompt you for e filename and then load the program. Once the program is loaded into memory, you simply type the name of the new program defined by the file and you will find that it takes off and does whatever the programmer has instructed it to do.

SPIRIT programs are prepared using a good text editor such as that sold by TSC. The statements are then read into SPIRIT with LOAD statements and then executed. For this reason it is necessary to test small segments of the code a line or two at a time before placing it in a large text file.

On the positive side, it should be noted that the code produced by this version of SPIRIT is true machine code and no inner interpreter is used. This improves the speed of execution.

In all fairness however, it should be noted that SPIRIT is not for the beginning programmer. The combination of Reverse Polish Notation and the heavy use of stack manipulation makes the syntax confusing at times. The syntax of the conditional iteration words are also hard to get used to.

Here's a final example to illustrate. Nearly everyone active in this field is familiar with the IF A THEN B construct. A typical SPIRIT statement reads:

```
'TEST : INNUM IF "-OK-" MSG THEN ;
```

In English, if the number received from the terminal is not equal to zero the message -OK- will be printed. If the number input is equal to zero then the message will not be printed.

Besides the IF ... THEN, SPIRIT provides the IF ... ELSE ... THEN, BEGIN ... END, BEGIN ...IF ...REPEAT, DO ... LOOP, and DO ... U+LOOP constructs. To this writer the syntax of all of them is just a little confusing. After all, isn't readability a good part of fine programming.

In conclusion, SPIRIT is an outstanding piece of software for the trained programmer who understands stacks and can speak fluent Reverse Polish Notation. It allows very short programs which can accomplish tasks performed by very long assembly code. The beginner, however, should beware.

A 68 Micro Journal™ lab rating of AAA.

Rating Scale:
AAA - Excellent
AA - Good
A - Fair (could be better but works)
P - Poor (may not always work properly)
X - Not recommended for children
(or anything else!)

Dale Puckett
Contributing Editor

32K for ½ Price

Here is a way SWTPC MP-16 Memory Board owners can save $60 to $95 dollars, depending on where they buy their 4116 dynamic RAM's.

This short, albeit quick and dirty, hardware fix will allow the original MP-16 board (the one with four rows of 8K memory chips) to address a full 32K of memory after adding only eight 4116 dynamic RAM's.

The fix came about after I bought eight brand new RAM's from ASAP Computer Products, Inc., at the Philadelphia show for only $60 dollars. Frankly, I forgot I had the earlier board that uses four rows of 8K chips (they are actually defective 4116's and Motorola, who built the board for SWTPC, put logic on the board which prevents the 6800 from addressing the defective half -- this gives them a market for the defective chips).

Down to business! If you own this board and only have it populated with 16K and would like to have all 32K of low memory on one board, follow these steps. If you own a newer model MP-16, don't worry. You can only buy it with 32K of chips installed.

Locate U-51, an 8T97 on the lower right hand corner of the board. This chip has an extra section which is not connected and we will use it to supply addressing and refresh to memory address bit six.

Connect Pin 4 of this chip to Pin 6. Connect Pin 5 to Pin 13.

Connect Pin 14 to Pin 13 of U-50 (the second chip from the right on the bottom of the board).

Cut the connection between the end of the 18 ohm resistor and the memory address bit six buss. Run a wire from the end of the resistor to Pin 13 of any one of the memory chips in the second row.

Cut the connection between Pin 13 on the second row and pin 13 on the third row. You will find this foil trace near the top of the rear side of the board. This cut allows the top half of the board to be addressed separately from the bottom half.

Connect an 18 ohm resistor from pin 5 or Pin 13 of U-51 to the foil that connects to Pin 13 of the memory chips, rows three and four (this is the foil you cut loose from the original 18 ohm resistor).

Now short Pin 12 to Pin 11 of U-50. This puts the RAS4 NOT signal on RAS3 NOT (the one that talks to your new 16K chips) also.

I attempted the last step by using a 74LS32 quad OR gate and for some reason it did not work. Logically it should. I might have purchased a bad chip or I may have introduced timing problems.

Even though the hardwired OR is probably not a good idea engineering-wise, it does work. I ran TSC's MEMTEST for four or five hours and didn't miss a lick.

If you are a purist you can simply buy another eight 16K chips and plug them in row four. But, it will cost you an additional $60 dollars.

My thanks go to Tom Speer in Syracuse, New York, who solved the refresh problem for me. I hope everyone with an original model MP-16 will be able use this conversion to their advantage.

Interfacing the Daiblo Hy-Type

Steve Carter
Box 192
Rifle, CO 81650

The Diablo Hy-Type II probably represents the state of the art in high speed impact printers. It utilizes a daisy wheel printing mechanism which is capable of bidirectional printing at some 45 characters per second. I have a SWTP system operating under Mini-Flex™ (someday soon, I'll probably have to convert to FLEX 2.0™), and use it primarily for word processing in my law office. After attempting to use another Selectric-based system, I decided that I needed the higher speed and better quality offered by the Diablo. I found that Xerox™, the conglomerate which owns Diablo, offered the most attractive lease-option plan, so about three weeks after I placed the order, my (actually theirs) Diablo 1610 Receive-only printer arrived.

I found out that the Diablo has very few mechanical parts to wear out (which is nice out here in the boondocks, since repair can really be a problem); and is controlled by a microprocessor (an 8080, alas) with an extensive program in ROM. The printer's versatility is enhanced by a number of features which are under software control.

The special features are invoked by a series of commands starting with "ESC" ($1B) followed by one or two other characters. Among the special features are:

Code	Feature
$31	Set horizontal tab
$32	Clear all tabs
$33	Graphics mode
$35	Forward print
$36	Backwards print
$39	Set left margin
$30	Set right margin
$41	Print in red
$42	Print in black
$09(n)	Absolute horizontal tab to position (n)
$0B(n)	Absolute vertical tab to position (n)
$5F	Set horizontal spacing to n-1 x 1/120 inch

Among other things, the ability to set the horizontal spacing to a defined length allows right-margin justification by increasing by a fraction of an inch the space between characters. The TSC Text Processor simply pads the line with spaces. Some of the Z-80 based text processors allow proportional spacing, which looks a lot nicer, and I hope that TSC is working on a modification of their processor to do the same thing.

Until that day arrives,

however, I thought that the most useful feature would be to use the backwards printing. Unfortunately, the computer has to send the characters to the printer backwards when the backwards printing mode is selected. Otherwise, every other line will have to be read from right to left. Which isn't very useful!

I wrote a printer driver for the Diablo which initializes the MP-S serial port, strapped to 300 baud, and allows for most of the alternate lines to be printed backwards. The program begins at $5F00, which is near the top of memory in my system, but it could as easily be assembled elsewhere. I use an ACIA MP-S at Port 3, $800C, although this could, also, be changed to suit the individual system.

Port initialization.

The Diablo is pretty finicky about the signals it receives. The requirements are set forth fully in the manual I received; but none of the port initialization routines gave the Diablo what it wanted. It requires a seven bit word, with odd or even parity and one stop bit. INITL, from $5E26 to $5E3D first of all sends the ACIA the proper code for this type of output, and then sets the left margin to 12, which is the standard I have established for the documents we use in the office. The margin is set by sending the terminal two control strings; "ESC"-"HT"-"$0C" for an absolute horizontal tab to 12; then "ESC"-"$39" which sets the left margin. The absolute horizontal tab uses the 12 characters-per-inch scale rather than 10, so that the tab is actually set to 12 on the "elite" scale, which corresponds to 10 on the "pica" scale. I use "pica" typewheels exclusively. The routine finally resets the buffer pointer to the beginning of the print buffer, and returns.

ACIA output.

The ACIA output routine, which I called STUFF, simply puts what's in ACC A into the ACIA. It's straight from TSC. If you didn't need backwards printing, then all you'd need would be INITL and STUFF.

Backwards printing.

However, with the machine whizzing along at 300 baud, the carriage returns can cause a lot of mechanical bumping and shaking, and I could see problems as my computer and disk drives were being jarred with every carriage return. There are two ways of accomplishing bidirectional printing; in each one, you could put the characters into a buffer, then take them out as needed and in the direction desired. If the lines were not of equal length, you would have to calcuate the horizontal position of the line to be printed backwards and send the machine an absolute horizontal tab to that position. Such a routine would insure that every other line was printed backward, but it would also require some method of determining where the print head should be positioned, since the horizontal tab uses a different scale. Such is beyond my limited capabilities as a programmer, so I cheated, and wrote the program to print backwards only those lines which were of the same length as the previous line. Listing a Basic program would cause problems using this method, but since most of my work is right-justified, I thought the compromise was acceptable.

OUTPUT first saves ACCA, ACCB and the index register,

then determines if the character is a null or line feed. If it is, then no action is taken. If the character is anything other than a carriage return, then the character is put in a 155 byte buffer, the buffer pointer is incremented, and the registers are restored. Since the Diablo can print no more than 155 characters on a line, no more space was needed.

A carriage return signifies the end of a line, and the program then transfers to CRET, which first outputs a line feed, then determines if there's anything in the buffer. If there isn't, then the registers are restored, and the program is ready to accept more characters into the buffer. If there is something in the buffer, then the machine determines if the length of this line (TEMP1) is equal to the length of the last line (TEMP2); if they are, and if the last line was printed forwards (DIRFLG is not 0), then the contents of the buffer are printed from right to left by PBKWRD. If either of these tests are false, then a carriage return is output (which both lines up the margin and resets forward printing) and the contents of the buffer are output from left to right by PFWD.

The program should contain enough information for anyone even remotely familiar with machine language programming to figure out and modify if required.

The Diablo has exceeded my expectations, and with this interim program (waiting for proportional spacing - hint!) its usefulness has been greatly enhanced.

If any reader has any questions or suggestions, I'd appreciate hearing from them.

```
                        NAM    DPRIN
                    * CREATES PRINT.SYS FOR DIABLO HY-TYPE
                    * PRINTER PR MITTING BACKWARDS PRINTING

                    * STEVE CARTER
                    * BOX 192
                    * RIFLE, COLORADO 81650

800C                ACIA   EQU    $800C       FOR PORT #1

5E00                       ORG    $5E00
5E00 7E 5E 26       INIT   JMP    INITL       INITIALIZE SERIAL PORT
5E03 7E 5E 54       OUTCHR JMP    OUTPUT      WITH BACKWARDS PRINTING
5E06 7E 5E 47       OUTCH1 JMP    STUFF       NO BACKWARDS PRINTING

5E09                ACCA   RMB    1
5E0A                ACCB   RMB    1
5E0B                XTEMP  RMB    2
5E0D 00             TEMP1  FCB    $0
5E0E 00             TEMP2  FCB    $0
5E0F 00             DIRFLG FCB    $0
5E10                BUFPTR RMB    2           BUFFER POINTER

5E12 B7 5E 09       SAVE   STA A  ACCA        COMMON SAVE
5E15 F7 5E 0A              STA B  ACCB
5E18 FF 5E 0B              STX    XTEMP
5E1B 39                    RTS

5E1C B6 5E 09       RESTOR LDA A  ACCA        COMMON RESTORE
5E1F F6 5E 0A              LDA B  ACCB
5E22 FE 5E 0B              LDX    XTEMP
5E25 39                    RTS

5E26 86 0F          INITL  LDA A  #%00001111 MASTER RESET
5E28 B7 80 0C              STA A  ACIA
5E2B 86 0D                 LDA A  #%00001101 7 BITS, ODD PARITY, 1 STOP BIT, CLOCK
5E2D B7 80 0C              STA A  ACIA
5E30 CE 5E E0              LDX    #MARGIN     SET LEFT MARGIN
5E33 C6 05                 LDA B  #5          CONTAINS 5 BYTES
5E35 8D 07                 BSR    PRINT
5E37 CE 5E E7              LDX    #BUFFER
5E3A FF 5E 10              STX    BUFPTR
5E3D 39                    RTS

                    * PRINT STRING POINTED TO BY X
                    * ACCB CONTAINS # OF CHARACTERS

5E3E A6 00          PRINT  LDA A  0,X         PRINT STRING
5E40 8D 05                 BSR    STUFF
5E42 08                    INX
5E43 5A                    DEC B
5E44 26 F8                 BNE    PRINT
5E46 39                    RTS

                    * P   WHAT'S IN ACCA INTO ACIA

5E47 37             STUFF  PSH B              PUT IT INTO ACIA
5E48 F6 80 0C       STUFF2 LDA B  ACIA
5E4B 57                    ASR B
5E4C 57                    ASR B
5E4D 24 F9                 BCC    STUFF2     IF ACIA NOT READY
5E4F 33                    PUL B
5E50 B7 80 0D              STA A  ACIA+1
5E53 39             STUFF3 RTS

                    * GENERAL OUTPUT

5E54 8D 5E 12       OUTPUT JSR    SAVE
5E57 81 00                 CMP A  #0          ANYTHING THERE?
5E59 27 F8                 BEQ    STUFF3      NO, SO RETURN
5E5B 81 0A                 CMP A  #$0A        LINE FEED?
5E5D 27 F4                 BEQ    STUFF3      IF SO, RETURN
5E5F 81 0D                 CMP A  #$0D        CARRIAGE RETURN?
5E61 26 03                 BNE    OUT1
5E63 7E 5E 79              JMP    CRET        YES, GO TO PRINT LINE
5E66 FE 5E 10       OUT1   LDX    BUFPTR      GET POINTER
5E69 A7 00                 STA A  0,X         STORE CHARACTER
5E6B 08                    INX                BUMP POINTER
5E6C FF 5E 10              STX    BUFPTR      STORE POINTER
5E6F B6 5E 0D              LDA A  TEMP1       GET COUNT
5E72 4C                    INC A              BUMP
5E73 B7 5E 0D              STA A  TEMP1       STORE IT
5E76 7E 5E 1C              JMP    RESTOR

5E79 86 0A          CRET   LDA A  #$0A        LINEFEED
5E7B 8D 5E 47              JSR    STUFF       PRINT
5E7E B6 5E 0D              LDA A  TEMP1       ANYTHING IN BUFFER?
5E81 26 03                 BNE    CRET1
5E83 7E 5E 1C              JMP    RESTOR      NO, SO RETURN
5E86 F6 5E 0E       CRET1  LDA B  TEMP2       LENGTH OF LAST LINE
5E89 13                    CBA                EQUAL?
5E8A 27 02                 BEQ    CRET2
5E8C 20 07                 BRA    PFWD        NO, PRINT FORWARD
5E8E 7D 5E 0F       CRET2  TST    DIRFLG      LAST LINE PRINTED BACKWARD?
5E91 27 02                 BEQ    PFWD        YES, SO PRINT THIS ONE FORWARD
5E93 20 2A                 BRA    PBKWRD

                    * PRINT FROM BUFFER FROM LEFT TO RIGHT

5E95 86 0D          PFW    LDA A  #$0D        PRINT CARRIAGE RETURN
5E97 8D 5E 47              JSR    STUFF
5E9A 87 5E 0F              STA A  DIRFLG      SET DIRECTION FLAG
5E9D CE 5E E7              LDX    #BUFFER     POINT TO BUFFER
5EA0 A6 00          PFWD1  LDA A  0,X         GET CHARACTER
5EA2 8D 5E 47              JSR    STUFF       PRINT IT
5EA5 08                    INX                BUMP POINTER
5EA6 BC 5E 10              CPX    BUFPTR      DONE?
5EA9 27 02                 BEQ    PFWD2
5EAB 20 F3                 BRA    PFWD1       NO, GET NEXT CHARACTER

5EAD B6 5E 0D       PFWD2  LDA A  TEMP1       TAKE CURRENT COUNT
5EB0 B7 5E 0E              STA A  TEMP2       STORE IT
5EB3 7F 5E 0D              CLR    TEMP1       CLEAR CURRENT COUNT
5EB6 CE 5E E7              LDX    #BUFFER     POINT TO BUFFER
5EB9 FF 5E 10              STX    BUFPTR      STORE IT
5EBC 7E 5E 1C              JMP    RESTOR      AND RETURN

                    * PRINT FROM BUFFER, RIGHT TO LEFT

5EBF CE 5E E5       PBKWRD LDX    #BACK       POINT TO CONTROL STRING
5EC2 C6 02                 LDA B  #$2         SET COUNT
5EC4 8D 5E 3E              JSR    PRINT       PRINT IT
5EC7 86 20                 LDA A  #$20        BACK UP ONE
5EC9 8D 5E 47              JSR    STUFF
5ECC 7F 5E 0F              CLR    DIRFLG      CLEAR DIRECTION FLAG
5ECF FE 5E 10              LDX    BUFPTR      GET BUFFER POINTER
5ED2 09                    DEX                DECREMENT ONE
5ED3 A6 00          PBK1   LDA A  0,X         GET CHARACTER
5ED5 8D 5E 47              JSR    STUFF       PRINT IT
5ED8 8C 5E E7              CPX    #BUFFER     DONE?
5EDB 27 D0                 BEQ    PFWD2       YES
5EDD 09                    DEX                DECREMENT POINTER
5EDE 20 F3                 BRA    PBK1
```

```
                    * SET LEFT MARGIN TO 10 ($0C)
5EE0 1B         MARGIN  FCB     $1B,$09,$0C
5EE1 09 0C
5EE3 1B                 FCB     $1B,$39
5EE4 39

5EE5 1B         BACK    FCB     $1B,$36   SET BACKWARDS PRINTING
5EE6 36

5E87            BUFFER  RMB     155
5F82            FINIS   EQU     *

                    * GET FLEX PARAMATERS

0010                    ORG     $10
0010 5E 00              FDB     INIT
0012 5E 03              FDB     OUTCHR

710D                    ORG     $710D
710D 5E 03              FDB     OUTCHR
                        END

NO ERROR(S) DETECTED

 SYMBOL TABLE:

ACCA    5EC9    ACCB    5ECA    ACIA    000C    BACK    5EE5    BUFFER  5E87
BUFPTR  5E10    CRET    5E79    CRET1   5EB6    CRET2   5EBE    DIRFLG  5EDF
FINIS   5F82    INIT    5E00    INITL   5E26    MARGIN  5EE0    OUT1    5E66
OUTCH1  5E06    OUTCHR  5E03    OUTPUT  5E54    PBK1    5ED3    PBKWRD  5EBF
PFWD    5E95    PFWD1   5EA8    PFWD2   5EAD    PRINT   5E3E    RESTOR  5E1C
SAVE    5E12    STUFF   5E47    STUFF2  5E48    STUFF3  5E53    TEMP1   5ED0
TEMP2   5E0E    XTEMP   5E0B
```

Hemenway's CP/68 a Review

Dr. Chuck Adams
421 Frankie Ln.
Lewisville, TX 75067

An operating system is defined as an organized collection of programs and data that is specifically designed to ease the creation of computer programs and control their execution on a computer system.

The user of a computer system is to perform some function or set of functions by creating a task or program or a set of programs to create and/or manipulate data of different types. The most elementary operating system is the MONITOR, such as MIKBUG (a trademark of MOTOROLA, SWTBUG (a trademark of Southwest Technical Products Corporation), SMARTBUG (a trademark of Smoke Signal Broadcasting), and a multitude of others. The typical monitor allows the user to create, load, and save object or machine programs, usually using paper tape, cassette, or similar external medium for external storage, and allowing additional functions to be performed with the use of a keyboard. It doesn't take the user of such a system long to become discouraged with the amount of time that is usually required to load and save the contents of memory at rates of 300 to 1200 baud. Economically, the systems are cheap, but cost the user in manpower and time.

As the user matures and can economically afford to upgrade a simple system by purchasing more expensive peripherial equipment such as disk drives, then more sophisticated software must be obtained to allow the flexibility and the power of the hardware to be used to its fullest. Disk drives and their accompanying interface are usually purchased from a vendor and may be supplied with an operating system. The operating system may reside in one or more EPROMs, as is the case with PERCOM systems, or the software may be contained on diskette(s), as is the case with SSB and SWTPC systems. I'll let Hal Hauch, et. al. argue over who's the best, etc. I'm interested in reviewing one operating system that is available on all these systems, and that is "CP/68" (a trademark of Hemenway Associates, Inc. of Boston, Mass.).

The name of the game with operating systems is the control and use of "system resources", usually divided into three separate classes of Hardware, Information, and Human Resources. Hardware resources of course refers to the computer system itself and includes the processor, main memory, input/output (I/O) devices, and the space on external storage devices such as the disk drives. Information resources include the available programs and associated data. This information is to be made readily available to the user of the computer, and as more sophisticated systems are created to allow the sharing of resources among two or more users. Human resources will be used to refer to the effort and time expended by the user to perform the task(s) desired. This may mean the creation and debugging of a new program or just the daily use of a running program to balance the check book or some similar applications program.

The measure of the effectiveness of an operating system, i.e. its usefullness to the user, is a measure of its performance. Some of the areas here, as used in the measure of large operating systems are throughput, how much work can be performed in a given length of time; response time, the time between a unit of work is started by the user and when it is completed; and availability, how much of the time is the system working as opposed to not working and not tied up by repair or use by others.

All the above terms are presented here to familiarize the reader with the "buzz-words" associated with the discussion to follow.

An operating system is a program, and as such must require memory in order to operate. Here two choices exist for the designer, either put all of desired features or commands in memory simultaneously, or place the most important and most used commands into memory with the other least used commands to be called from the disk upon request. The first choice requires an heck of a lot of memory, which is still a valuable resource not to be wasted, and the later is a compromise. With some commands residing on disk and called from disk when they are to be executed causes some delay in the process. but this is not too much to ask of the user as it does allow the user more room in his or her system memory to be used for other things. The commands that stay in memory during the life of the operating system are called "resident" commands. Commands that are called from a disk for execution are called "transient" commands. The operating system program that resides in memory is usually termed the "nucleus" and is loaded into memory with a bootstrapping technique whereby a small program loads the operating system into memory from the disk.

Operating systems are used to create, access, or delete files from external media, usually diskettes. Here we are using the CP/68 on Shugart SA-400 minifloppies (TM) with both PERCOM and SWTPCo controller boards. In CP/68, references to files consist of three parts; 1-drive number, 2-name, and 3-extension, of which only two are required, the name and extension. If no drive number is used in the reference to a file then the drive number is assumed to be 0. For example, the name 0:BASIC.TXT refers to a file on drive number 0 with name BASIC and extension TXT, which implies a source file of a BASIC incremental-compiler in 6800 assembler language. (Isn't that what you thought it was?) The name field is allowed a length of up to 8 characters and the extension a length of up to 3 characters.

A very useful feature of CP/68 is that 8 logical device names are used to refer to physical devices. These are

CON - the consol terminal I/O device
PTR - paper-tape reader
PTP - paper-tape punch
DSK - disk drive
LPT - line printer
MTA - magnetic tape
TTY - teletype
NUL - null device.

The user is allowed access to input/output operations involving these devices as well as reassigning the function to other physical devices. For example, if the user has a CRT being used for the consol terminal and a Model 43 for the TTY device, then an assignment operation can be preformed to make the TTY the consol and vice-versa, thus allowing the user to make a hard-copy of the output from the consol, as was done for the examples for this article.

Let me take this paragraph to complement Jack Hemenway and Bob Grappel for an excellent job of human engineering. This author and Noel Strader authored a 4K two pass editor/assembler package which used a feature that we find enjoyable and necessary and a similar feature exists within CP/68. After every output of a CR/LF the serial port is checked to see if a character has been typed since the last CR/LF. If one has been typed, then a pause is started until another character is entered from the keyboard. This is useful for page changes, etc. I would like to see more software use this feature, even BASICs everywhere. Good job Jack and Bob!!!!

Now we are ready to look at the commands available. They are listed in all caps followed by whether they are transient or resident in CP/68 and a brief description of what they do. The documentation for all the software from Hemenway and Associates is very good and would require one year of space in '68 to do here and I and you do not want to waste this valuable space. Anyway, onward...

ASSIGN (transient) - assigns logical device names to physical devices

DELETE (transient) - deletes file from disk. Will prompt before doing so, thus preventing accidental (well, maybe reducing) erasure of files.

DIRECTORY (resident) - give me names of all files on disk specified.

EXIT (resident) - return to system monitor.

INITIALIZE (transient) - initialize diskette. Also a prompt given.

JUMP (resident) - leave CP/68 and start execution at given address.

LINK (transient) - set linkage for BOOT command.

LOAD (resident) - loads program from disk into memory.

PIP (transient) - peripheral interchange program (PIP). This is probably one of the most complete and useful of the commands available in CP/68. It allows the user to copy from one media to another. Useful for backup of files, etc.

RENAME (resident) - rename file without dinking with contents.

SAVE (resident) - save area of memory to file.

SECURITY (transient) - allows protection of files (using access code) from deletion or renaming.

SET (transient) - allows user to customize CP/68 to characteristics of console and printer devices. Used to specify backspace char, delete char, width, etc.

STATUS (transient) - lists present state of device assignments.

SUBMIT (resident) - allows the user to use file containing CP/68 commands.

The entire system is well designed using advanced techniques for operating system designs. An Advanced User's Guide is available with the system to illustrate the use of supervisor calls (SVCs) and other interesting and useful internal information.

This is the first DOS that will have the source code available in book form. This greatly increases its power in that the user can see what was done to implement the program and for the advanced programmer, will allow him or her to add on features. See HEMENWAY ASSOCIATES, INC. advertisement elsewhere in this journal. "CP/68 AN M6800 OPERATING SYSTEM" by J. Hemenway and R.D. Grappel is a 241 page book containing the user's guide, advanced user's guide, and the complete source listings for CP/68 (including the disk driver routines for PERCOM, SWTPCo, and SSB disk systems!!!). The listings are clean and clear and the entire book (as advertised p. 44 of Issue 6 of the '68' MICRO JOURNAL) is professionally done and marketed under the trademark of Software Source Book by HEMENWAY ASSOCIATES INC.

The system is very well written and documented as far as this author is concerned. It will require a system that allows the SWI to be vectored, which will not be possible with early versions of Smoke Signals SMARTBUG monitor. One thing that the software does not do is require any external I/O routines, etc. It is self-contained. I realise that this author probably left many questions and features undiscussed, but I have tried to give an overview of the system. It is left as an exercise for the reader to investigate the many facets of the programs provided by HEMENWAY ASSOCIATES INC
101 Tremont St
Boston Mass. 02108.

```
DIR
DIRECTORY OF DRIVE 0

    NAME       T   A  FT-FS  LT-LS   NS

ASSIGN  .CMD  01  02  01 01  01 05  0002
BOOT    .CMD  01  02  01 09  01 09  0001
DELETE  .CMD  01  02  01 03  01 02  0003
INIT    .CMD  01  02  01 06  01 04  0003
LINK    .CMD  01  02  01 08  02 05  0003
PIP     .CMD  01  02  02 09  03 0A  0010
SECURITY.CMD  01  02  03 04  04 01  0003
SET     .CMD  01  02  04 05  04 09  0002
STATUS  .CMD  01  02  04 03  04 03  0001
CP68    .SYS  01  02  04 07  07 06  0021
LNKEDT  .BIN  01  02  07 0A  0E 02  0045
XREF    .BIN  01  02  0E 06  11 06  001F
EDIT    .BIN  01  00  11 0A  13 06  0014
ASMB    .BIN  01  02  13 0A  17 01  0022
STRUBAL .BIN  01  02  17 05  1E 09  0048

00293. SECTORS USED

.STATUS
CON = TTY
PTR = PTR
PTP = PTP
DSK = DSK
```

```
LPT = LPT
NTA = NTA
TTY = TTY
NUL = NUL
.INIT 1
INIT. DISK IN DRIVE 1 ? .Y
.DIR 1
DIRECTORY OF DRIVE 1

    NAME        T   A  FT-FS  LT-LS   NS

00000. SECTORS USED
```

Letters—New Products—Etc.

JOHN P. TUCKER
Post Office Box 2898
Laredo, Texas 78041
October 6, 1979

Don Williams, Sr.; Editor
'68' Micro Journal
Post Office Box 849
Hixson, Tennessee 37343

Dear Don,

Each time I use a published routine or program I try to find an opportunity to write the author a personal note of thanks. The pages of '68' Micro Journal have been so filled with useful and interesting routines lately that I am hopelessly behind in my correspondence. This, then, is an open letter to all contributors to the Journal -- and to you -- saying:

THANK YOU AND KEEP UP THE GOOD WORK.

Here is a one-line BASIC QUICKIE that will save a lot of time and trouble when working with trig functions. All of the BASIC's with which I am familiar will relort trig functions in radians whereas most electronic work will want to use degrees as the function of input. The following will derive a constant so that you can input degrees and have your program translate its internal radian functions:

```
10 LET K=(2*PI)/360
```

or if your BASIC does not have the PI function, use:

```
10 LET K=(2*3.1415926#)/360
```

using as long a string of the PI equivalent shown as your BASIC will accept. One of my BASICs has a six-digit limit and thus will take only 3.14159 whereas another one will accept 3.14159265. If your BASIC will take a longer string you'll have to look it up -- I don't remember PI beyond what is shown and I'm too lazy to go look it up tonight. Using this will save dropping out of BASIC and going to an involved machine-language routine.

The following program will demonstrate the use of the line. If you have a book of trig functions handy it may well point up a failing or two in your BASIC -- SWTPCo Disc BASIC 3.0 (as an example) does not accurately report all sine and cosine functions and should not be relied upon for critical calculations. The demonstration program is:

```
10 LET K=(2*3.141592654)/360
20 FOR L=1 TO 90
30 PRINT L, SIN(L*K), COS(L*K)
40 NEXT L
50 END
```

The correct use of the constant K is to multiply the angle expressed in degrees by the constant (L*K in the example) in calling for the trig functions sine, cosine, and tangent. The above program will list sines and cosines from 1 to 90 degrees -- compare them with a reliable book of functions to check the reliability of your BASIC trig system.

This little routine saved me an involved argument with the Federal Communications Commission at a time I could not at all afford to argue.

Again, thanks for the exceptionally fine Journal.

Sincerely,

John

John P. Tucker

Oswald H. Stanton
3402 Highgate La.
St. Charles, MO 63301
Nov. 1, 1979.

'68; Micro Journal
2C12 Rambll Rd.
PO Box 849
Hixson, TN 37343

Dear Sirs:

I would appreciate your publishing the paragraph below in the next available space in your "HELP" column.

Does anyone have, or know, where I may obtain a patch to SWTPC 8K BASIC V.2.3 that will allow it to accept 0 (zero) subscripts?

While I have your attention; I think it would be a good idea if you would have more articles directed toward people like me who don't have and can't afford disk(s), but must back along with old slow poke "K. C. Standard" cassette tape.

Also, please remember the beginner and the guy who has had no formal computer education, but is into this thing strictly as a hobby and intertainment.

Thank you,

Oswald H. Stanton

Oswald H. Stanton.

JOHN P. TUCKER
Post Office Box 2898
Laredo, Texas 78041
November 13, 1979

Don Williams, Sr., Publisher
'68' Micro Journal
Post Office Box 849
Hixson, Tennessee 37343

Dear Don,

Here is another of my (in)famous one-liner BASIC quickies, and this time it might even be usable.

I use several versions of BASIC (three highly modified from the original SWTPCo Disk BASIC Version 3.0 and the new TSC BASIC FOR 6800 miniFlex version). The disk routines and the print routines are radically different between the two and programs written for one may or may not run in the other. I found that after a long operating session I would lose track of (or just plain forget) what language was in the computer or which BASIC was required by the program called up from the disk. What I needed was some way of alerting me when I loaded and tried to execute a program in the wrong BASIC.

Then it dawned on me -- why hadn't I thought of this before? Both BASICs start out differently in memory. SWTPCo's BASIC at the beginning memory location of 0100 contains a 'DD' whereas TSC BASIC memory location 0100 will show a 7E. Why not take advantage of this? Now? Easy, since both BASICs tolerate multiple statement lines and will NOT execute the second statement in such a line if the first statement is not true. So the following came into being:

```
10 LET A=PEEK(256)
20 IF A<>126 THEN PRINT "THIS PROGRAM MUST RUN
                        IN TSC BASIC":END
```

(Actually my one-liner has two lines!) Just plug it on the front end of your BASIC program and should you call up the mis-matched pair then starting the program will alert you and drop back to the READY command in BASIC. You may also change the conditional THEN to a line number following the end of your program and print out a list of instructions of what to load, etc. Naturally, use the PRINT variations and change <> to = as necessary to reference the correct BASIC version required.

This is too simple -- it must be the wheel re-invented!

Keep the good journals coming.

Best wishes,

John Tucker

John P. Tucker

October 26, 1979

'68' Micro Journal
3018 Hamill Road
P. O. Box 849
Mixson, TN 37343

Robert Levine
32 King Street
New York, NY 10014

Gentlemen:

I'd like your help in locating the survivors and/or successors to a 6800-based-products manufacturer which apparently went out of business in mid-1969.

The company was JP Products Co. of Corona or Fullerton, California. The only individual's name I have is John Jaworski. They made an SS-50 mainframe with some very interesting interface cards, and had a 2K monitor called JPBUG with some extremely useful and unique routines. The few products I bought from them were excellent and deserving of success.

If you or any of your readers can help me locate anyone possessing an inventory of JP's boards or the copyright to their monitor program, I'd be very grateful.

Sincerely,

Robert Levine

Technical Systems Consultants, Inc.

Specialists in Software & Hardware for Industry and the Hobbyist

Box 2574 W. Lafayette IN 47906 (317) 463-2505

November 20, 1979

Don Williams, Editor
'68' Micro Journal
3018 Hamill Rd.
PO Box 849
Mixson, Tennessee, 37343

Dear Sir:

The ED-DOS patch submitted by Art Weller in the Nov/Dec issue of '68' Micro Journal may run into problems with some of the FLEX commands. Those commands which work with disk files may call a FLEX routine which closes all open files. Some commands do this only on detecting an error on the disk or in the command parameters. Others call this routine every time as a quick way to clean up before terminating. The problem is that this will also close the file that is being edited. When this happens, the file being edited is truncated or deleted, although the .BAK file is still intact. Leaving the editor with the STOP or LOG commands will give the message SYSTEM FILE STATUS ERROR. There is no clean, simple way to get around this, so caution is advised when using this patch.

Respectfully yours,

Richard F. Kovarik
Analyst

RFK/pr

SPHERE
NEWSLETTER

NEWS RELEASE SEPTEMBER 13 1979

****

The Sphere Microcomputer Newsletter will be starting its fifth year of publication. It contains hardware and software features of interest to every M6800 microcomputer owner and specifically to SPHERE owners. The newsletter is mailed six times a year. Subscribers should remit $12.00 domestic or $16.00 foreign to Jeffrey Brownstein, 2 Tor Road , Wappingers NY. 12590. Material for publication should be sent to coeditor: Roger J. Spott 13975 Connecticut Ave. , Wheaton, Md. 20906.

Small Business Advertising

It has been noted that there are many small 6800 businesses that can not substain a prolonged advertising campaign. In order to assist these in establishing 'name recognition' and at the same time let our readers know what they have to offer, we are starting, with the February '80 issue, a 'BUSINESS CARD' advertising page.

The plan works something like this; First we will place your ad, which will be a direct copy of your business card, on a special page with other 'BUSINESS CARD' advertisers. The ad must be exactly as you submit your business card. We will not allow any changes unless you change your business card, then the new card copy will replace the existing card advertising. There will be a one time charge of $7.50 to "CHANGE" card copy, as indicated above.

It will be required that you pre-pay for 3 months of advertising, at the rate of $39.95 per month, for a total of $119.85. Payment in advance is required.

As is our existing policy to protect our readers, the following requirement applies to this type advertising, as all other advertising:
All advertisers taking advantage of this offer, must submit, for
our review, any product that is not nationally known or that we have
not reviewed or used previously. Ads will not be accepted that do not indicate a telephone number.

Contact the 68 Micro Journal™ office for additional details.

PERCOM
PERCOM DATA COMPANY, INC.

NEWS RELEASE

RELEASE Immediate

CONTACT Harold Mauch
(214) 272-3421

PERCOM'S 6809 SS-50 BUS CPU CARD IS ALSO STAND-ALONE MICROCOMPUTER

Garland, Texas - August 30, 1979 - Harold Mauch, president of Percom Data Company, announced here today that the company has added a 6809 central processor card to the company's SS-50 bus products line.

Designated the SBC/9^{tm} (Single-Board-Computer/6809), the PC card may be used either as a stand-alone control computer or as an upgrade CPU card for SS-50 bus microcomputers.

The SBC/9^{tm} includes its own operating system, called PSYMON^{tm} (Percom System Monitor) in a 1K ROM plus provision for an additional 1K of ROM.

Also included on-board are 1K of RAM, a 110-baud to 19.2 kbaud clock generator and a full duplex RS-232-C serial interface.

The SBC/9^{tm} is completely compatible with the existing SS-50 bus, requiring no modification of the motherboard, memory or I/O slots.

The SBC/9^{tm} hardware features include:

- a 'super port' - provision on the card for multi-address, 8-bit bidirectional data lines to interface directly to off-card I/O devices such as an encoded keyboard.
- an 'intelligent data bus' - multi-level data bus decoding that allows multiprocessing and bus multiplexing of other bus masters, such as DMA controllers and bus analyzers, under control of a single executive program.
- extended address line capability to accommodate up to 16 megabytes of memory. Extension does not disable the on-board baud rate clock nor require additional hardware in I/O slots.
- all on-board devices are fully decoded so that off-card devices may use adjoining memory space.

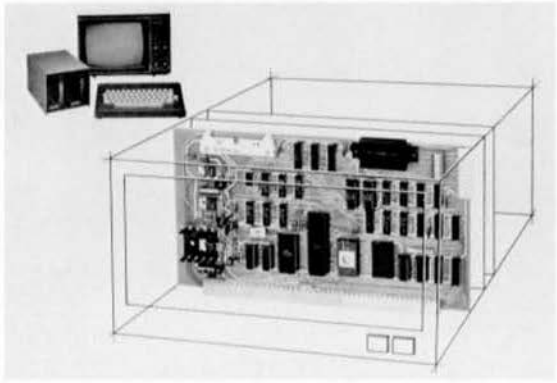
- all address, control and data lines are fully buffered.
- serial interface Reader Control output for control of a cassette interface, tape punch/reader or similar device.
- circuitry to accommodate either two 2708 ROM chips or one 2716 ROM chip. (Normally, PSYMON™ the Percom System Monitor, occupies the first 2708 position.

The SBC/9™ with the PSYMON™ operating system and a comprehensive user's manual sells for $199.95.

Orders may be placed by dialing Percom's toll-free number, 1-800-527-1592, and may be paid by check or money order, COD, or charged to Visa or Master Charge accounts. Texas residents must add 5% sales tax.

Dealer inquiries are invited.

tm trademark of Percom Data Company, Inc.



PERCOM DATA COMPANY 211 N. Kirby Garland, Texas 75042
(214) 272-3421

AMRAD AMATEUR RADIO RESEARCH AND DEVELOPMENT CORPORATION

1979 October 22

FOR IMMEDIATE RELEASE

For more information contact
Paul L. Rinaldo
1524 Springvale Avenue
McLean, Virginia 22101
(703) 356-8918 days/eves

The Amateur Radio Research and Development Corporation (AMRAD) -- an amateur radio and personal computing club with headquarters in the Washington, DC area -- has been awarded a federal grant for research in applying personal computers to telecommunications and education for the deaf. The grant is administered by the Bureau of Education for the Handicapped, U.S. Office of Education, Department of Health, Education and Welfare.

The first phase of the program involves interfacing popular home computers such as the Radio Shack TRS-80 and Apple Computers, Inc. Apple II for both ASCII and Baudot telephone-line communications. The Baudot capabilitiy is needed to equip the computer to communicate with Baudot teleprinters (TTYs) which are in widespread use by the deaf. The hardware, software and protocols developed under this program will be released to industry for commercial production. When these products become available in quantity, the deaf will be able to communicate with other deaf persons, other inidividuals with computers, telecomputing services, as well as make normal use of a computer in the home.

The second phase will be to establish a computer information exchange. It will be used for informal communications between those involved in education of the handicapped. In concept, it will be similar to that of the Computerized Bulletin Board System (CBBS). In addition to a message system, it will eventually have an extensive data base which can be accessed by remote callers. The system will have seperate telephone ports for ASCII and Baudot terminals.

AMRAD is interested in opening a dialogue with organizations and individuals actively involved in telecommunications and education for the handicapped. Please write AMRAD, 1524 Springvale Ave., McLean, VA 22101.

10 MEGABYTE DISK FOR 6800 EXORCISOR (TM)

SD announces a 10 megabyte Winchester disk drive for Motorola EXORciser (or other 6800) systems. STORAGE DEMON (TM) relieves the problems of limited disk capacity inherent in the Motorola-supplied EXORdisk configurations. The disk provides a capacity of 19,000 512 byte sectors. STORAGE DEMON is compatible with both EXORciser I and EXORciser II. Software support includes SDOS, an interrupt-driven disk operating system with keyboard typeahead, automatic disk read-ahead and disk sector pooling, dynamic files with random access to the byte, and complete device independence. SDOS also supports EXORdisk I, II or III to allow use of these drives for data storage and/or backup of the Winchester drive. SDOS supports the powerful SD Business BASIC Compiler, with 18 digit BCD arithmetic, long names, IF-THEN-ELSE, file I/O, error trapping and many other features. STORAGE DEMON is a trademark of SD.

For further information, write for free catalog to Software Dynamics, 2111G W. Crescent Avenue, Anaheim, CA 92801.

MOTOROLA Semiconductor Products Inc.

News Release

THE MC68000 MICROPROCESSOR IS HERE!

May of 1979 marked a significant event in the evolution of contemporary microprocessors. That's when the first functional MC68000 was processed by Motorola after a significant period of incubation. Now, the MC68000 is coming off the production line in large enough quantities for world-wide sampling and its debut marks the start of a new era in microcomputer-based applications.

The MC68000 is a 16-bit processor.

That immediately lifts it a large step (application wise) above the 8-bit category that has been dominating the industry for the last half-dozen years and puts its capability squarely in competition with those of many minicomputers.

The MC68000 is high-level-language oriented.

Designed to respond efficiently to high-level instructions, the MC68000 goes a long way toward cutting the cost of programming - the most expensive portion of computer development.

The MC68000 has 32-bit internal processing capability.

That makes it the only 16-bit machine with upward expansion potential without a major redesign...and without obsoleting existing software .

Because of these features, the MC68000 microprocessor represents a major advance in the state-of-the-art.

In Motorola's product line, the MC68000 is the most advanced of the many MPU/MCUs that have been introduced over the past years. It doesn't obsolete the other types, however. Rather, it satisfies an applications void that currently exists between the upper capabilities of 8-bit processors and the more sophisticated functions of the minicomputer. And - the 16-bit architecture and its unique high-level-language orientation offers Original Equipment Manufacturers a pervasive basic component with which to implement proprietary machines with minicomputer capabilities.

The MC68000 is a well-supported processor. At its introduction it is accompanied by -

1. An immediately available MC68000 Design Module (MEX68KDM) which, when used in a Motorola EXORciser®, offers a

formidable development for the design of MC68000-based systems; or, when used 'standalone' with a power supply and suitable peripherals, represents an elaborate microcomputer with on-board software development and debug capability.

2. Full documentation, including data sheets and manuals that describe the operation and applications of both the MC68000 MPU and the Design Module.
3. A software package that includes Cross Macro Assemblers for use with the EXORciser, the IBM370 and the PDP-11.
4. Accredited world-wide "second sources" including Rockwell in the U.S., Thompson-EFCIS in Europe, and Hitachi in Japan.

While initial production of the MC68000 will go partly into world-wide sampling, a significant portion will go into the production of Design Modules. This is based on the premise that evaluation of the microprocessor will require a number of peripheral chips and that the availability of a complete board-mounted and operational evaluation capability (the Design Module) would substantially aid a customer's system development effort.

A variety of MC68000-complementary peripheral chips are in design and will start becoming available early in 1980. But in the meantime MC68000 system implementation can be accomplished with the standard series of M6800 peripheral chips with which the new processor is compatible. This compatibility of components in Motorola's MPU/MCU family is one of the desirable features of the Motorola processor line, in that it permits hardware developed for one processor to be used with more powerful, upgraded systems.

Production of the MC68000 is being expanded rapidly. It is expected that all sampling requirements will be filled on an "as required" basis before the end of 1979, with production quantities becoming available during 1980. Introductory prices for MC68000 products are as follows:

		Unit Price
MC68000	16-bit microprocessor	$ 249.00
MEX68KDM	Design Module	$ 1795.00
Cross Macro Assemblers		
M68KOXASM8L2	370 Version	$ 1500.00
M68KOXASM8L3	PDP-11 Version	$ 1500.00
M68KOXASM8LD	EXORciser, 6800 Version	$ 990.00
M68KOXASM8L1	EXORciser, 6809 Version	$ 990.00

* EXORciser is a trademark of Motorola Inc.

6809 to the AM9511

Don E. Farmer
6711 Mullins No. 69
Houston, TX 77081

Recently I have interfaced the M6809 in my SWTPC computer to the AM9511. The AM9511 is made by Advanced Micro Devices and is a fast, powerful arithmetic processor. In addition to fixed and floating point operations, trigonometric and other scientific functions are evaluated. Advanced Computer Products sells this chip for $195. So for those who need the speed of hardware floating point operations and who do not wish to "experiment" with an expensive chip, here is the way I did my interface.

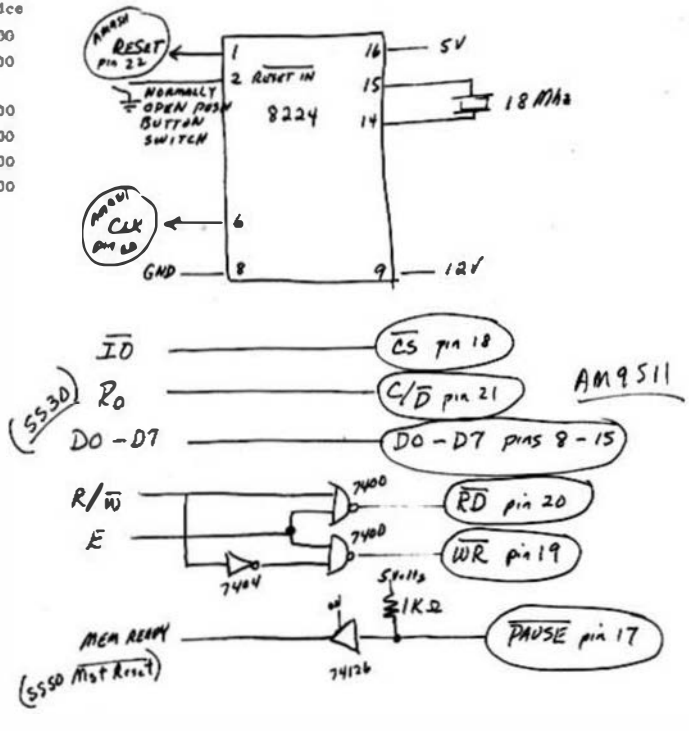
I used a prototype board on an I/O slot with both 5 Volt and 12 Volt regulators. The AM9511 needs an input for CLK. Since clock-stretching with Mem Ready on the M6809 is used for programmed I/O transfers, it could not be used. Instead an 8224 clock generator and driver (an 8080 part, sorry about that!) with its 18Mhz crystal was used. RESET for the AM9511 was also obtained from the 8224.

Mem Ready on the M6809 (or the M6875 clock on an A2 board) to PAUSE active low proved a little tricky for me. The way I have it is probably not the best but it does indeed work. I think my figure along with the AM9511 data sheet should see you through the rest of the interface. But by all means check your voltages before plugging in the Am9511!

I have found that the AM9511 will not work unless it is first reset. Upon powering the chip up, I have to remind myself to press the push button switch I have dangling out the back of my computer. Otherwise I have had no problems.

I have been using TSC's assembler for the 6809 and have found the following macros useful. The AM9511 is on Port #0.

```
OP MACRO
   TST $E001   See if AM9511 is busy
   BMI *-3     Loop until ready
   LDA #\1     Op code is parameter of macro
   STA $E001
   ENDM

LD MACRO                    ST MACRO
   LDD #1+2                    LDA $E000
   STB $E000                   LDB $E000
   STA $E000                   STD #1
   LDD #1                      LDA $E000
   STB $E000                   LDB $E000
   STA $E000                   STD #1+2
   ENDM                        ENDM
```



October 17, 1979

'68' Micro Journal
3018 Hamill Road
P.O. Box 849
Hixson Tennessee 37343

ATT: Mr. Don Williams Sr., Editor.

Dear Sir:

A few days ago I found that I needed to use some binary numbers in a Basic Program that I was working on, so I developed the enclosed Decimal to Binary Number Conversion. There is nothing unusual about the program but it occured to me, that maybe it would be of use to some of the readers of your fine magazine.

In addition to this 3 1/4" column format, I am enclosing the same letter in full page width not knowing which you would prefer to use, if in fact, either.

Hope you can find use for the program, and thanks for the '68' Micro Journal.

Very truly yours

JOHN H. DEAL
1235 Milano Drive
Naples Florida 33940
813-261-0532

CC: To Disk

```
LIST

  100 REM *** PROGRAM TO CONVERT DECIMAL NUMBERS TO BINARY NUMBERS
  110 PRINT CHR$(12);:REM *** HOME AND CLR SCREEN
  120 PRINT"    D E C I M A L   T O   B I N A R Y   N U M B E R"
  130 PRINT"                C O N V E R S I O N"
  140 PRINT"    ----------------------------------------"
  150 PRINT TAB(10);"FOR DECIMAL NUMBERS FROM 0 TO 65535"
  160 PRINT:PRINT
  170 DIM R(16)
  180 INPUT "WHAT IS THE DECIMAL NUMBER YOU WISH TO CONVERT";A
  190 REM *** LOP OFF UNUSED LEADING ZEROS
  200 IF A<16 THEN S=4:GOTO 250
  210 IF A<256 THEN S=8:GOTO 250
  220 IF A<4096 THEN S=12:GOTO 250
  230 IF A<65536 THEN S=16
  240 REM *** DO DIVISION AND CARRY
  250 FOR X=1 TO S
  260 LET B=A/2
  270 C=INT(B)
  280 IF B>C THEN R(X)=1
  290 IF B=C THEN R(X)=0
  300 A=C
  310 NEXT X
  320 PRINT
  330 PRINT"THE BINARY NUMBER IS: ";
  340 REM *** PUT SPACE BETWEEN GROUPS OF 4 DIGITS
  350 FOR X=S TO 1 STEP -1
  360 IF X=4 THEN PRINT" ";
  370 IF X=8 THEN PRINT" ";
  380 IF X=12 THEN PRINT" ";
  390 REM *** PRINT THE BINARY NUMBER
  400 PRINT R(X);:NEXT X
  410 PRINT
  420 PRINT:INPUT"DO ANOTHER";A$
  430 IF LEFT$(A$,1)="Y" THEN PRINT:GOTO 180
  440 REM *** OCTOBER 1979
  450 REM *** JOHN H. DEAL
  460 REM *** 1235 MILANO DRIVE
  470 REM *** NAPLES FLORIDA  33940
  480 REM *** 813-261-536
  490 END
```

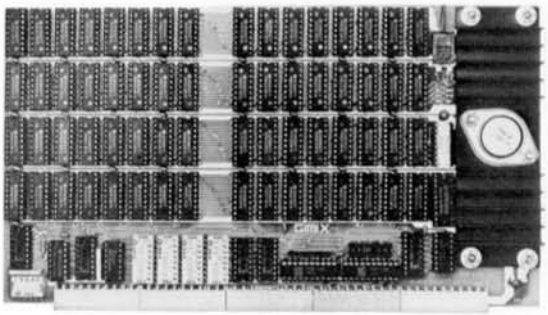
```
D E C I M A L   T O   B I N A R Y   N U M B E R
          C O N V E R S I O N
    ----------------------------------------
      FOR DECIMAL NUMBERS FROM 0 TO 65535

WHAT IS THE DECIMAL NUMBER YOU WISH TO CONVERT? 5
THE BINARY NUMBER IS:      0 1 0 1
DO ANOTHER? Y
WHAT IS THE DECIMAL NUMBER YOU WISH TO CONVERT? 33
THE BINARY NUMBER IS:      0 0 1 0    0 0 0 1
DO ANOTHER? Y
WHAT IS THE DECIMAL NUMBER YOU WISH TO CONVERT? 298
THE BINARY NUMBER IS:      0 0 0 1    0 0 1 0    1 0 1 0
DO ANOTHER? Y
WHAT IS THE DECIMAL NUMBER YOU WISH TO CONVERT? 24444
THE BINARY NUMBER IS:   0 1 0 1    1 1 1 1    0 1 1 1    1 1 0 0
DO ANOTHER? N

READY
```


GIMIX INC. 1337 WEST 37TH PLACE • CHICAGO, ILLINOIS 60609 • (312)927-5510 • TWX 910-221-4055

PRESS RELEASE

32K STATIC RAM BOARDS FOR 6800/6809

GIMIX ANNOUNCES IT IS NOW DELIVERING FROM STOCK THE FIRST FULLY STATIC 32K RAM BOARD FOR USE WITH THE SS50 (6800) AND SS50C (6809) BUS. THE BOARD FEATURES 4 INDEPENDENTLY DIP-SWITCH ADDRESSABLE 8K BLOCKS. EACH 8K BLOCK CAN BE ADDRESSED TO ANY 8K BOUNDARY OR DISABLED. THE BOARD IS CAPABLE OF DE-CODING THE FOUR ADDITIONAL ADDRESS LINES OF THE SS50C BUS TO ALLOW MEMORY DECODING UP TO 1 MEGABYTE. DIP-SWITCHES ENABLE OR DISABLE THE EXTENDED ADDRESSING AND SET IT TO ONE OF 16 POSSIBLE BANKS. USES LOW POWER 2114L RAM CHIPS AND TYPICALLY DRAWS ONLY 2 AMPS FOR 32K. THE BOARD IS DESIGNED FOR HIGH NOISE IMMUNITY. IT COMES FULLY SOCKETED AND HAS GOLD BUS CONNECTORS. THE PRICE FOR THE FULL 32K BOARD IS $548.15. 16K VERSIONS AT $328.12 AND 24K VERSIONS AT $438.14 ARE FULLY SOCKETED AND CAN BE EXPANDED UP TO 32K BY PLUGGING IN ADDITIONAL 2114LS. ALL VERSIONS ARE ASSEMBLED, BURNED IN, AND TESTED AT 2 MHZ.



GIMIX ANNOUNCES THAT IT NOW HAS AVAILABLE 50HZ EXPORT VERSIONS OF ITS POPULAR CHASSIS AND 6800 SYSTEMS. THE 115/230 VOLT 50HZ POWER SUPPLY USES A FERRO-RESONANT CONSTANT VOLTAGE TRANSORMER. IT IS IDENTICAL IN OUTPUT TO THE GIMIX 60HZ MODEL PROVIDING +8 VOLTS AT 25 AMPS AND + AND - 16 VOLTS AT 5 AMPS EACH, OVER INPUT RANGES OF 90 TO 240 VOLTS, 50 HZ AC. TO INSURE RELIABILITY, SYSTEMS ARE BURNED-IN AND TESTED USING AN IN HOUSE 50HZ POWER SYSTEM. THE 50HZ SUPPLY ADDS $30.00 TO THE EXISTING PRICES FOR CHASSIS AND SYSTEMS.

GIMIX
NOVEMBER 10, 1979
946 EVANS RD
NASHVILLE, TN 37204

MR DON WILLIAMS SR
'68' MICRO JOURNAL
3818 HAMILL RD
P O BOX 849
HIXSON, TN 37343

DEAR SIR:

DEBUGGING BASIC

TWO BUGS WHICH INFESTED THE COPY OF SWTPC DISK BA IC 3.0 THAT CAME WITH MY SWTPC MINI-FLOPPY DISK SYSTEM WERE THAT THE DATA POINTER RESTORE COMMAND WOULDN'T WORK AND THAT THE DATA READ COMMAND WOULDN'T WORK WITH MORE THAN ONE VARIABLE IN THE VARIABLE LIST. I FINALLY GOT BUSY AND TRACKED DOWN THE BUGS, AND I'D LIKE TO LET OTHER READERS OF '68' MICRO JOURNAL KNOW WHAT I'VE FOUND.

RESTORE

THE RESTORE COMMAND (EXAMPLE: 10 RESTORE) IS SUPPOSED TO CAUSE THE DATA BUFFER POINTER, WHICH IS ADVANCED BY THE EXECUTION OF READ STATEMENTS, TO BE RESET TO POINT TO THE FIRST POSITION IN THE DATA BUFFER. HOWEVER, I KEPT GETTING ERROR #30, ILEGAL FILE NUMBER, WHEN TRYING TO EXECUTE A RESTORE COMMAND. THE PROBLEM WAS AS FOLLOWS:

THE RESTORE ROUTINE, WHICH BEGINS AT $13E9 IN MY COPY OF BASIC, CALLS A SUBROUTINE AT $2056, THEN DOES A BCC TO S ANCH AROUND A JUMP TO THE DISK RESTORE ROUTINE. THE SUBROUTINE AT $2056 IS SUPPOSED TO RETURN WITH THE CARRY BIT SET IF THE FIRST NON-BLANK CHARACTER FOLLOWING THE RESERVED WORD "RESTORE" IS A POUND SIGN (#). THE POUND SIGN INDICATES A DISK CHANNEL NUMBER FOLLOWS, AND IS USED TO DIFFERENTIATE A DATA P INTER REST E FROM A DISK FILE RESTORE. SUBROUTINE $2056 ALSO IS CALLED BY THE READ ROUTINES TO SEPARATE DATA READS FROM DISK READS. THE BUG HERE IS THAT $2056 ALSO RETURNS WITH THE CARRY SET IF THE CHARACTER FOLLOWING "RESTORE" IS A NULL (#00, END OF LINE) OR COLON ($3A, STATEMENT DELIMITER). THE OFFENDER IS AS FOLLOWS IN MY VERSION OF BASIC:

```
2056 DE 34          LDX POSITN POSITION W/IN CURRENT LINE
2058 BD 088C        JSR SKIPSP SKIP PAST BLANKS
205B 27 0A          BEQ *+12   END OF LINE?
205D 81 3A          CMPA #':
205F 27 06          BEQ *+8    END OF STATEMENT?
2061 81 23          CMPA #'#   # DENOTES DISK CHANNEL
2063 27 02          BEQ *+4    NUMBER
2065 0C             CLC
2066 39             RTS
2067 00               C
2068 39             RTS
```

THIS CAN BE CORRECTED BY CHANGING THE CONTENTS OF $205C FROM $0A TO $08, AND THE CONTENTS OF $2060 FROM $05 TO $04. WITH THIS CHANGE, RESTORE WORKS INSTEAD OF GIVING AN ERROR MESSAGE.

READ

THE PROBLEM HERE IS THAT WHILE 10 READ A WORKS, 10 READ A,B DOESN'T (10 READ A,B RESULTS IN AN ERROR #12, UNRECOGNIZABLE STATEMENT). THE PROBLEM IS IN THE READ P TIME THAT STARTS AT $1366. DISASSEMBLING THE CODE BY HAND TURNED UP THE FOLLOWING:

```
1366 BD 2056        JSR ISDISK DESCRIBE ABOVE
1369 24 03          BCC *+5    DISK READ?
136B 7E 2021        JMP DISKRD YES, GO READ FROM DISK
136E DE 34          LDX POSITN NO. READ FROM DATA BUFFER
1370 BD 1000  LOOP  JSR GETVAR GET VARIABLE

1373 81 2C          CMPA #',   COMMA SEPARATES VARIABLES
1375 27 0A          BEQ *-116  ## BUG ## BRANCHES BACK
                               TO $1369
```

THE BEQ INSTRUCTION BRANCHES BACK TO THE THIRD BYTE OF AN INSTRUCTION. CHANGING THE BRANCH OFFSET FROM $8A TO $92 FIXED THE BUG.

DAVE GARDNER'S BOOK, A COMPANION TO ROBERT H. UITENBROEK'S BASIC INTERPRETER (S S I, 4327 E GROVE ST, PHOENIX, AZ 85040), WAS A CONSIDERABLE HELP IN UNDERSTANDING WHAT WAS GOING ON IN BASIC. A FEW ROUTINES IN MY BASIC WERE AT DIFFERENT LOCATIONS FROM THOSE LISTED IN THE BOOK. I DON'T KNOW IF THE DIFFERENCES ARE BECAUSE OF ERRORS OR ARE BECAUSE THE DISK BASIC REFERRED TO WAS THE 8-IN DISK BASIC. THE BOOK OUGHT TO BE HELPFUL FOR THE UITENBROEK BASIC CLONES (COMPUTERWARE, PERCOM, ETC.) AS WELL AS THE BASICS SPECIFICALLY DESCRIBED IN THE BOOK.

TSC SAID IN THEIR LAST NEWSLETTER THAT THEY STOPPED SUPPORTING MINI-FLEX AS OF NOVEMBER 1, 1979. I'M NOT SURE WHAT THEY MEAN. PERHAPS YOU COULD PRINT A CLARIFICATION FROM TSC.

VERY TRULY YOURS,
William R Hamblen
WILLIAM R. HAMBLEN

NEWTECH COMPUTER SYSTEMS INC.

230 CLINTON STREET
BROOKLYN, NEW YORK 11201
(212) 624-2238

Larry S. Williams
Executive Editor
'68' Micro Journal
3018 Hamill Rd.
PO Box 849
Hixson, Tennessee 37343

November 5,1979

Dear Larry:

Newtech's first product was our Model 6 Music board for 6800 S-100 bus computers, which we began selling in early 1977. The Model 68 was introduced for the SWTPC 6800, later that year. The software now given in the Model 68 User's Manual is our original single voice software. We subsequently wrote our MV80 multivoice software following similar, pioneering work, done by Hal Chamberlain for 6502 processors, and described in the September 1977 issue of BYTE Magazine. (Hal, incidentally, is Director of Engineering for Micro Technology Unlimited, which markets several excellent music products for 6502 machines including the KIM and PET. He also designed the Micro Music, Inc. product for the Apple Computer. Give him a plug if you can.)

Several aspects of Newtech's approach to music software benefit the hobbyist. The original single-voice and our MV80 multivoice music interpreters are written in BASIC, the language most universally understood by the average hobbyist. These programs use straitforward, well-documented coding, so that the hobbyist can learn exactly what we are doing. If he has the inclination, he can change or add special features without great difficulty. This is in contrast to several other available computer music products written entirely in assembly language, and supplied to the user only as machine code, without listings.

Another advantage of giving complete documentation relates to the 6800 market being so splintered in terms of software products, both for disks and cassettes, and in terms of processor clock speeds (an important factor for real-time processes like music production). One software version might work on just about every Apple, or every TRS-80, but no for our 6800's. We try to supply the user with everything he needs to adapt our software to his system. A drawback of course, to doing interpreters in BASIC is that the compile time can be long for long music scores. But an advantage to this method, is that it minimizes the computation that has to take place when the music is played, and keeps unwanted artifacts such as clicks, from appearing between notes.

Sincerely yours,
Stewart Newfeld

The New MSI Intelligent Interface

A new intelligent interface/controller board is being manufactured by MSI. The board contains a resident 6800 CPU, 2708(2716) EPROM, 1K of RAM, and a choice of a PIA or an ACIA for communication to the outside world. The board contains a 6850 ACIA chip, which resides on the interface bus of the host computer system, emulating a standard serial interface, SI-1W, in so far as the host computer is concerned.

The interface is available in three different configurations, all of which use the same circuit board with slightly different components installed. The INTCPU-1W model is configured with a 6850 ACIA interface communicating with the outside world and is used for an intelligent console controller. The INTCPU-2W is configured with a 6821 PIA interface communicating with the external device. This model is recommended for use with Centronics printers and can serve as a printer spooler using the 1K of on board RAM. The model INTCPU-3W uses a 6821 PIA and 50 pin ribbon cable connector for communication with a Qume printer. This version includes plotting software

DOUBLE DENSITY

The most reliable, cost effective disk system ever designed for the SS-50 bus is now available. The Southwest Technical Products Corp. DMF-2 disk system provides 2.5 M/bytes of usable (formatted) on-line storage. It offers the lowest cost per byte available on floppy disks at this time.

The DMF-2 features "Qume" DATATRAK 8 double headed eight-inch drives. We consider these to be the best drives we have ever tested. The 17½" x 5" x 21½" cabinet is made from 1/8 inch thick aluminum and finished with a super tough textured epoxy. The power supply has 115/230 volt capability and will operate from either 50 or 60 Hz. mains.

The controller is a direct memory access type circuit, using the 6844 DMA controller and a 1791 double density disk controller. This type circuit has a much higher data transfer rate than simple sector buffer type circuits and it also imposes far less overhead on the processor. The critical phase lock and data separator circuits use 1% components and time proven circuits to insure long term reliability. We find no statistical difference in the error rate of this controller and our single density controller.

The DMF-2 is supplied with the FLEX®-09 operating system. You can format and record in either single or double density. FLEX® is the world standard disk operating system for the MC6809 and is available for almost all 6809 family hardware, whatever the source.

The DMF-2 system includes the cabinet, power supply, controller, connecting cable, diskette with FLEX®-09, two drives and instruction manual. Shipping weight is 53 pounds.

DMF-2 Dual Double Density Disk Driver—assembled and tested. $2,495.00
DMF-2 Controller board retrofit for converting DMF-1 single density systems. . . . . $ 395.00

SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216 (512) 344-0241

Print with Quality and Speed

The Southwest Technical Products fast quality printer system is based on the "Qume" Sprint 3/45 daisy-wheel printer. For word processing applications, where quality and speed are both necessary , this printer is the answer. Over a hundred styles of printer wheels are available, including proportional space and foreign type fonts.

The SP-3 is supplied with the following features: out of paper detect, out of ribbon detect, top of forms eject, bottom feed slot, cover interlock, operator lights, paper handling system and switching power supply. Optional forms tractors are available for applications where these are desired. The SP-3 printer is supplied with a twelve-line interface and connecting cable for use with all Southwest Technical Products computers.

- Average text print speed of 45 characters/second
- Prints full characters of electric typewriter quality
- Uses variable intensity ballistic hammer which automatically adjusts to correct one of six strike intensities according to character size
- Accepts single sheets and continuous forms, with or without sprocket holes
- Prints on forms up to 15 inches wide
- 96 character positions on "daisy" printwheel
- Wide variety of standard font styles available in 10 and 12 pitch and proportional spacing
- Prints 132 columns at 10 characters/inch
- Prints 158 columns at 12 characters/inch
- Prints proportional spacing in increments of 1/120 inch, left or right
- Features electronic tabbing and carriage return up to 13.1 inches at 320 ms maximum
- Vertical spacing in increments of 1/48 inch, up or down
- Vertical slew rate of 5 inches per second
- Plotting resolution of 5760 points per square inch
- Features pressure platen; pin feed platens optional
- Easy to handle ribbon cartridge with multi-strike carbon, single strike carbon, or fabric ribbon available in black and colors
- Printwheel is easily operator changeable
- Operator controls include horizontal forms positioning, vertical forms positioning, forms thickness and ribbon advance

SP-3	Daisywheel Printer—with listed features, interface and power supply	$2,995.00
SP-5	Serial Daisywheel Printer—with above features and power supply (less serial interface)	$3,195.00
80026-01	Optional Forms Tractor	$ 190.00

SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216 (512) 344-0241

driver routines, printer spooling, and bidirectional printing capability for the Qume printer.

The use of the interface as a console/modem controller opens the door for many interresting possibilities. The interface can reset the host processor under software control, which allows a remote console, operating via a modem, to take complete control of a host computer aysttem for diagnostics as well as operation. The interface/controller can be programmed to bootstrap the host computer system and bring up an application program following a power failure. Additional uses will also be found in the area of multi-user or multi-tasking applications as well. The interface allows interactive I/O operations and buffering while relieving the load on the host CPU.

Technical Systems Consultants, Inc.
Box 2574
W. Lafayette, Indiana 47906

In the past, Technical Systems Consultants has developed a piece of software, distributed it, and then received user feedback. This is considered to be less than an ideal approach. The purpose of this survey is to get some feedback from our users before we develope a new program.

Technical Systems Consultants is considering developing and marketing another editor for the FLEX operating system. The new editor (MED) will be a screen oriented editor. As a result, information is needed on the types of hardware our users have and any ideas they may have about a screen oriented editor.

1. What brand of disk drives do you have? What model? How many?
   Is your mainframe homebrew?
   If not, who is the manufacturer and what make is it?

2. How much RAM do you have in your system (including RAM for the operating system)?

3. What operating system are you currenly using?
   Do you plan to change to a different one in the near future?
   If so, what one?
   Remember: MINIFLEX is not the same as FLEX 1.0.

4. What is the make and model of the terminal you use?

5. What is the maximum baud rate?
   What baud rate do you normally use?

6. What is the screen size (lines, columns)?

7. How intelligent is the terminal?
   a) move cursor up, down, left, right with a control character?
   b) position cursor at (X,Y) coordinate?
   c) insert/delete a character on a line?
   d) insert/delete a line from the screen?
   e) ability to readback the screen?

8. What options does your terminal have?
   a) numeric keypad?
   b) cursor keypad?
   c) others

9. Feel free to add anything you wish either to the space below or on a separate sheet of paper.

CFM File Lister

Lewis Middaugh
RM 218-0 Grad Hse East
West Lafayette, In 47906

This program prints, to a SWTPC PR-40 printer, a directory listing of CFM/3 files stored on cassette tapes. These files were created by the JPC Products Co.'s CFM/3 file manager driving their TC-3 cassette interface.

The CFM software is CFM/3 Ver 2.PA which places the file manager software at C000 hex and the CFM/3 stack at A080 hex. The specifics of the program are documented in the listing.

The operation of the program consists of loading the program, getting the cassette ready to be read, executing the program, and when finished, resetting the computer to exit the program.

This program provides a convenient method of documenting the contents of the cassette. The PR-40 paper neatly fits inside the cassette storage case.

And lastly, a good word for JPC Products Company, based on these two products. The documentation is fairly good and the product works. I have not noticed any obvious bugs. Also, some time after I had purchased the TC-3 cassette interface kit, I received a letter from JPC. Inclosed was a capacitor to replace one in my kit. The change was to ensure proper operation of the 7805 voltage regulator. I found it very pleasing to know JPC supports their products.

```
00010                    NAM   PDIR    PRINT DIRECTORY UTILITY
00020                    OPT   O,S
00030                *
00040                * CFM3 UTILITY TO PRINT DIRECTORY TO PRINTER
00050                *  MAY 9, 1979   LEWIS MIDDAUGH
00060                *
00061                *    THIS UTILITY READS THE FILE ID'S FROM THE
00062                * ENTIRE TAPE.  THIS DATA IS PRINTED THRU PORT #2
00063                * TO A PR-40.  THIS LISTING CAN BE SAVED WITH THE
00064                * TAPE FOR FUTURE REFERENCE.
00065                *
00070                *  THE PROGRAM SECTION OF THIS ROUTINE IS
00080                *    RELOCATABLE AND EPROMABLE.
00090                *
00100                *
00110                *  EFINITIONS
00111                *
00120  A88C  NAMFLG EQU   $A88C   CFM NAME SPECIFIED FLAG
00130  A885  READFLG EQU  $A885   CFM READ OPERATION FLAG
00140  C75C  PHEDR  EQU   $C75C   HEADER STRING
00150  C77E  CRLFSP EQU   $C77E   CR LF AND SPACE STRING
00160  A893  TEMPI  EQU   $A893   TEMPORY STORAGE BUFFER
00170  C7A6  TYPMSG EQU   $C7A6   TYPE MESSAGE STRING
00180  A8A0  FTYPE  EQU   $A8A0   FILE TYPE READ IN
00185  A88B  TYPE   EQU   $A88B   LEGAL FILE TYPE FOR OPERATION
00190  A8A7  FBEGA  EQU   $A8A7   FILE BEGIN ADR
00200  A8A1  FNAME  EQU   $A8A1   FILE NAME READ IN
00210  801C  PRPIA  EQU   $801C   PR-40 PRINT PIA P RT
```

```
00220                    *
00230                    * EXTERNAL ROUTINES
00231                    *
00240   C37C   GETID  EQU   $C37C     CPM, GETS FILE ID FROM TAPE
00250   C3E6   RFILE  EQU   $C3E6     CPM, READS FILE FROM TAPE
00260   C296   MOTOFF EQU   $C296     CPM, TURNS TAPE DRIVE OFF
00270                    *
00280                    *
00290                    * PROGRAM SECTION
00291                    *
00300 A100               ORG   $A100
00301                    *
00310 A100 7F A08C LDIR  CLR   NAMFLG   INIT
00315 A103 7F A08B       CLR   TYPE
00320 A106 CE 801C       LDX   #PRPIA
00330 A109 6F 01         CLR   1,X
00340 A10B 86 FF         LDA A #$FF
00350 A10D A7 00         STA A 0,X
00360 A10F 86 3F         LDA A #$3F
00370 A111 A7 01         STA A 1,X
00380 A113 CE C75C       LDX   #PHEDR    POINT TO HEADER STRING
00390 A116 8D 39         BSR   PSTG      GO1 PRINT HEADER
00400 A118 BD C37C LDIR1 JSR   GETID     GET FILE HEADER
00410 A11B 7A A085       DEC   HEAFLG    SET FLAG SO THIS FILE
00420 A11E BD C3E6       JSR   RFILE     IS NOT LOADED.
00430 A121 BD C296       JSR   MOTOFF    TURN TAPE DRIVE OFF
00440 A124 CE A0A7       LDX   #FBEGA
00450 A127 8D 24         BSR   PHX2      PRINT STARTING ADR
00460 A129 8D 22         BSR   PHX2      ENDING ADR
00470 A12B 8D 20         BSR   PHX2      TR NSFER ADR
00480 A12D C6 06         LDA B #$06      PRINT SIX CHAR FILE NAME
00490 A12F CE A0A1       LDX   #FNAME
00500 A132 A6 00   PNAME LDA A 0,X
00510 A134 8D 42         BSR   PASC
00520 A136 08            INX
00530 A137 5A            DEC B
00540 A138 26 F8         BNE   PNAME
00550 A13A CE C7A6       LDX   #TYPMSG   PRINT FILE TYPE
00560 A13D 8D 32         BSR   PSTG
00570 A13F B6 A0A8       LDA A FTYPE
00580 A142 8B 30         ADD A #$30
00590 A144 8D 32         BSR   PASC
00600 A146 CE C77E       LDX   #CRLFSP
00610 A149 8D 26         BSR   PSTG
00620 A14B 20 CB         BRA   LDIR1
00630                    *
00640                    * PRINT WORD FOLLOWED BY SPACE
00650 A14D 8D 06   PHX2  BSR   PHEX2
00660 A14F 8D 04         BSR   PHEX2
00670 A151 86 20         LDA A #$20
00680 A153 20 23         BRA   PASC
00690                    *
00700                    * PRINT BYTE AS TWO HEX NUMBERS
00710 A155 A6 00   PHEX2 LDA A 0,X
00720 A157 8D 05         BSR   PHXL
00730 A159 A6 00         LDA A 0,X
00740 A15B 08            INX
00750 A15C 20 04         BRA   PHXH
00760                    *
00770                    * PRINT HI NIBBLE AS ASCII HEX NUMBER
00780 A15E 44      PHXL  LSR A
00790 A15F 44            LSR A
00800 A160 44            LSR A
00810 A161 44            LSR A
00820 A162 84 0F   PHXH  AND A #$0F     PRINT LOW NIBBLE AS
00830 A164 8B 30         ADD A #$30     AS IT HEX #
00840 A166 81 39         CMP A #$39
00850 A168 23 02         BLS   PHXR1
00860 A16A 8B 07         ADD A #$7
00870 A16C 20 0A   PHXR1 BRA   PASC
00880                    *
00890                    * PRINT ASCII STRING TERMINATED BY $04
00900 A16E 8D 08   PSTG1 BSR   PASC
00910 A170 08            INX
00920 A171 A6 00   PSTG  LDA A 0,X
00930 A173 81 04         CMP A #4
00940 A175 26 F7         BNE   PSTG1
00950 A177 39            RTS
00960                    *
00970                    * PRINT ASCII CHARACTER
00980 A178 37      PASC  PSH B             SAVE REGISTERS
00990 A179 FF A093       STX   TEMP1
01000 A17C CE 801C       LDX   #PRPIA    POINT TO THE PR-40 PORT
01010 A17F A7 00         STA A 0,X       DRIVE IT THE CHARACTER
01020 A181 C6 37         LDA B #$37      SEND PR-40 THE STROBE
01030 A183 E7 01         STA B 1,X
01040 A185 C6 3F         LDA B #$3F
01050 A187 E7 01         STA B 1,X
01060 A189 6D 01   LOOP  TST   1,X       WAIT FOR PR-40 TO BE READY
01070 A18B 2A FC         BPL   LOOP
01080 A18D E6 00         LDA B 0,X
01090 A18F FE A093       LDX   TEMP1
01100 A192 33            PUL B
01110 A193 39            RTS
01120                    *
01130                    END
NAMFLG A08C
HEAFLG A085
PHEDR  C75C
CRLFSP C77E
TEMP1  A093
TYPMSG C7A6
FTYPE  A0A8
TYPE   A08B
FBEGA  A0A7
FNAME  A0A1
PRPIA  801C
GETID  C37C
RFILE  C3E6
MOTOFF C296
LDIR   A100
LDIR1  A118
PNAME  A132
PHX2   A14D
PHEX2  A155
PHXL   A15E
PHXH   A162
PHXR1  A16C
PSTG1  A16E
PSTG   A171
PASC   A178
LOOP   A189
```

```
FIRST LAST TRKS (NAME) STATUS
0100 0FFF FFFF BASIC  TYPE 3
1000 2000 FFFF BASIC  TYPE 3
A200 A351 0100 BASIC  TYPE 2
0100 0FFF FFFF BASIC  TYPE 3
1000 2000 FFFF BASIC  TYPE 3
A200 A351 0100 BASIC  TYPE 2
2000 3DA7 FFFF DITIT  TYPE 4
2000 3DA7 FFFF DITIT  TYPE 4
2000 6C62 FFFF EXPLOR TYPE 4
2000 6C62 FFFF EXPLOR TYPE 4
```

Flex on MSI

Mark Sproul
Micro Computer Consultant
c/o Rutgers Univ.
1368 Noah Rd.
North Brunswick, NJ 08902

Midwest Scientific Instruments has come out with FLEX for their FD-8 disk system and I now have it up and running on my SWTP system. I have a SWTP system using an MP-A/2 CPU board with 52K of ram, 6K of EPROM and an MSI FD-8 eight inch disk system with two drives.

MSI came out with the first floppy for the SS-50 buss. The disk is completely controlled by software as opposed to the controller chips used in most systems. This seems a little archaic but considering when it was introduced it is quite impressive. The disk is an eight inch hard sectored disk using drives by GSI. GSI has recently been purchased by Siemens. These drives are Shugart SA-801 compatible (or SA-800) but configured for hard sectored. Their disk system hardware has been quite reliable.

Bringing up FLEX:

The disk I was supplied with contained FLEX for an MSI system. This meant I/O at $F500 and ram at $FD00 which is impossible with a SWTP system. I had to burn into ROM 1K of disk drivers at $EC00 which FLEX was going to be looking for. MSI supplied me with a cassette of the source to these routines and I burned them into the EPROM on my MP-A/2 CPU board. These routines make access to the I/O at $F5xx and RAM at $F030. I changed the I/O to $801C where the disk controller resides on my system and I changed the RAM references to $9030.

The next step was a bit more tricky. The operating system as it resides on the disk expects the I/O ports at $F5xx and will not boot entirely. The boot procedure starts by reading in the first four sectors of the disk which is in turn a boot for the rest of the operating system. This secondary boot had to be modified to address the I/O port at $801C and RAM at $9030. This was done by reading the four sectors in with MSI FDOS MINIDOS utility, changing the locations and writing it back out. Then it would boot properly but would not run because FLEX still has to be changed to reflect the address changes. All 'LDS #' (load stack pointer immediate) instructions must be changed so that the stack resides in real memory. After this the system is up and running but other changes still have to be made.

The NEWDISK command has to be changed where it accesses memory location $F03A. I changed this to $903A; it must be the same as the RAM change mentioned above. The PRINT.SYS and PRINT.CMD commands have to be changed to do I/O to the right port and PRINT.CMD along with the operating system has to be changed to access an unused serial I/O port. This is really bogus but the way MSI implemented the interrupt driven printer is to program the ACIA (6850) to generate an interrupt (IRQ) when the transmit buffer is empty. They just dumps nulls out it to get an interrupt 30 times a second or at whatever rate the ACIA is running.

Don't be alarmed by the clanking of the disk drive while it is booting. It is normal but sounds like its killing the disk. This is caused by loading and unloading the head for each call to ROM disk driver routines. It was the only way MSI could get everything to work right and their hardware does not automatically unload the head. They are coming out with a new controller board that will get rid of this problem.

I have written a copy single disk (COPYSD.CMD) command that will read a file into memory, tell you to insert the other disk and write the file back out. This is the only way to copy files using a single drive system.

MSI has been helpful in bringing up FLEX. They have also introduced a Multidisk FLEX that allows combining 8 inch, 5.25 inch and hard disk drives all on the same system running FLEX. This has the feature of allowing the user to define which drive number is what kind of drive. For example you can specify that drive 0 is an 8 inch drive, drive 1 a hard disk and drive 3 a mini floppy, or any other configuration. This sounds like a very promising version of FLEX.

All programs written for mini FLEX 2.0 or FLEX 1.0 for the SWTP large disk system will run with this version of FLEX.

Anyone having questions on any of this are invited to write me. Please enclose a SASE for a reply. I will also try to help in exchanging software for MSI FLEX and I am trying to set up a program exchange library for MSI-FLEX users. Anyone wishing to participate should send a disk with whatever software you have to exchange (no proprietary software please). This disk should include a file NAME.TXT that has your name in the following format:

format	example
your name	Mark Sproul
title and/or company	Micro-computer consultant/Rutgers Univ
your address	1368 Noah Road
city, state, zip	North Brunswick, NJ 08902
2 line discription of system (or blank)	SWTP,MP-A/2,dual MSI FD-8 floppy, 52K ram, answer/orig MODEM,9-track tape drive

The 2 line description can be any number of characters, the rest should be 40 characters max.

The programs should include source whenever possible and a documentation file. The doc file should explicitly state what kind of system it runs on specifying if it has any I/O addresses or stack address that need to be changed. There should be a printed listing of the directory and a category for each program, i.e. games, applications, system program, etc.

Include a second formatted disk for return of programs. State what categories of programs you want. Also include enough postage to get your disk returned (in stamps would be easiest). Your disk will be returned in the same packaging it was sent in unless it is in bad shape due to the post office.

I do not intend for this to become mostly a BASIC games exchange however they are not discouraged. I would like to see such things as editors, interpreters, compilers, etc.

I take no responsibility for any of the software submitted. Hopefully everyone who submits programs will include an address where he can be reached and correspondance should be with him. I cannot guarantee that I will return your disk immediately nor can I be sure of the success of this undertaking.

WINDEX: 6809 Driver Percom Electric Window

Cliff Rushing
1820 Edna
Arlington, TX 76010

INTRODUCTION

This article describes an arrangement and lists the software for using the Percom 6809 SS-50 bus Single-Board Computer (SBC/9) with the Percom ELECTRIC WINDOW (video display card) in a way which completely eliminates the need for a standard data terminal.

The Percom 6809 Single-Board Computer has sockets for two ROMs. One socket contains PSYMON, the Percom ROM operating system. The other socket is available for operating system extension or user utility programs. The PSYMON operating system is designed to "look" for special purpose I/O drivers in the second ROM. Whenever the 6809 is reset, PSYMON looks at the first address ($F800) of the second ROM. If the ROM is missing or if the first byte is not $7E, PSYMON configures the operating system for ACIA input and output using the I/O drivers within the PSYMON ROM.

If a $7E code is the first byte of the second ROM, PSYMON re-vectors its input (INEEE), output (OUTEEE), and break (BREAK) routines through the second ROM. The ACIA drivers within PSYMON are still usable by calling programs. I/O can be re-vectored to the ACIA by changing the jump vectors in the scratch pad RAM. This arrangement is convenient for connecting other I/O devices such as parallel keyboards and memory resident video displays to the operating system.

The attached software listing describes drivers which link the Percom "ELECTRIC WINDOW" to the character output routines in PSYMON.

Since the Percom 6809 processor has provision for a parallel keyboard input, a driver is also provided to link the Parallel keyboard to the character input routine in PSYMON.

This arrangement completely eliminates the need for a standard data terminal. The cassette SAVE and LOAD functions are still handled thru the on board ACIA. The ACIA can also handle a serial ASCII printer if desired.

Since I am not yet thoroughly familiar with all of the 6809 codes, most of this program was written in 6800 mnemonics. This doesn't matter because the Percom 6809 assembler converts 6800 mnemonics to the appropriate (and sometimes strange) 6809 codes.

INITALIZATION

Since the Percom "ELECTRIC WINDOW" uses a programable CRT controller it is necessary to initialize the controller for the desired display. My CRT has a standard P4 phosphor which flickers annoyingly when interlaced scanned, so the initialization sequence programs the CRT controller for 16 lines of 80 characters per line non-interlaced. If you have a longer persistence CRT (such as the green P39) you can change the initialization to 24 lines with interlace scan. The "ELECTRIC WINDOW" instruction manual contains the necessary information.

KEYBOARD INPUT

The parallel keyboard input routine was stolen from a similar routine in the Motorola TVBUG. The low active keyboard strobe is connected to bit 7 (MS bit) of the parallel I/O port on the Percom SBC/9. If bit 7 is high the keyboard is ignored. The FLAG register prevents multiple character input from repeated scans of the parallel port before the operator releases a depressed key.

The keyboard routine is designed for keyboards which maintain the strobe pulse as long as a key is depressed and may not work with keyboards which generate a narrow strobe pulse. The keyboard I use is an inexpensive George Risk keyboard with a 7404 inverter on the strobe line.

DISP AY DRIVER

The video display driver provides automatic scrolling and recognizes a number of ASCII control codes such as Backspace, Carriage Return, and Line Feed.

Control-Z Clear Screen
Control-H Cursor Left
Control-J Cursor Down
Control-K Cursor Up
Control-L Cursor Right
Control-N Graphics Mode Off
Control-O Graphics Mode On

Keyboard input during display is handled by the BREAK routine. The graphics mode selects the alternate symbols ROM on the "ELECTRIC WINDOW".

Other details of the drivers may be obtained by studying the listing.

The memory map for the Percom 6809 computer with the "ELECTRIC WINDOW" installed is as follows:

0000-D7FF User Memory (54K)
D800-DFFF ELECTRIC WINDOW display
E000-EFFF Percom Disk (3k ROM)
F000-F3FF Scratch Pad RAM for PSYMON
F400-F7F7 User I/O
F7FA-F7FB ACIA on the SBC/9
F7FC-F7FF Parallel Keyboard
F800-FBFF Personality ROM (WINDEX)
FC00-FFFF PSYMON Operating System

PERCOM 6809 ASSEMBLER V1.1

```
00001                   ********************************************************
00002                   *
00003                   *
00004                   *                    WINDEX V1.1
00005                   *                  BY CLIFF RUSHING
00006                   *          A VIDEO DRIVER FOR THE PERCOM ELECTRIC
00007                   *          WINDOW IN THE PERCOM 6809 COMPUTER
00008                   *
00009                   *
00010                   ********************************************************
00011                           NAM   WINDEX
00012           D800    BASE    EQU   $D800     *START OF VIDEO RAM
00013           DCFF    EOT     EQU   BASE+$4FF
00014           F7FC    KEYPRT  EQU   $F7FC     *ADDRESS OF KEYBOARD PORT
00015           DFCD    CURV    EQU   BASE+$7CD  *CURSER LINE REGISTER
00016           DFCC    CURH    EQU   BASE+$7CC  *CURSOR HORIZONTAL REGISTER
00017           DFC6    BOTLNE  EQU   BASE+$7C6  *BOTTOM LINE
00018                   *
00019                   *
00020                   *
00021                   * GLOBAL EQUATES FOR PERCOM 6809 SBC AND OISK
00022                   * SYSTEMS AS OF JUNE 26,1979
00023                   *
00024                   *
00025 F000                      ORG   $F000
00026                   * OISK LOCATIONS FIRST
00027 F000      0001    DRV     RMB   1        *DRIVE NUMBER
00028 F001      0001    TRK     RMB   1        *TRACK NUMBER
00029 F002      0001    SCTR    RMB   1        *SECTOR NUMBER
00030 F003      0002    BAKLNK  RMB,  2        *BACKLINK
00031 F005      0002    FWDLNK  RMB   2        *FORWARD LINK
00032 F007      0001    BYTCNT  RMB   1        *BYTE COUNT
00033 F008      0002    DATADD  RMB   2
00034 F00A      0001    FILTYP  RMB   1        *FILE TYPE
00035 F00B      0002    CKSUM   RMB   2        *CHECK SUM
00036 F00D      0002    POSTAM  RMB   2        *POSTAMBLE
00037 F00F      0005    CRNTRK  RMB   5
00038 F014      0002    TA      RMB   2
00039 F016      0002    TW      RMB   2
00040 F018      0001    BYTECT  RMB   1        * (RETRY) *BYTE COUNT CO  TER
00041 F019      0002    BEGADD  RMB   2        *BEGINING ADDRESS
00042 F01B      0002    ENDADD  RMB   2        *END ADDRESS
00043 F01D      0002    STKPTR  RMB   2        *STACK POINTER TEMPORARY
00044 F01F      0001    XHI     RMB   1        *X TEMP HI
00045 F020      0001    XLO     RMB   1        *X TEMP LO
00046 F021      0002    BUFPTR  RMB   2        *COMMAND BUFFER POINTER
00047                   * BREAK POINT TEMPORARY STORAGE
00048 F023      0002    BPADD1  RMB   2        *1 ADDRESS
00049 F025      0001    BPDTA1  RMB   1        *1 DATA
00050 F026      0002    BPADD2  RMB   2        *2 ADDRESS
00051 F028      0001    BPDTA2  RMB   1        *2 DATA
00052 F029      0002    BPADD3  RMB   2        *3 ADDRESS
00053 F02B      0001    BPDTA3  RMB   1        *3 DATA
00054 F02C      0002    SWI3    RMB   2        *SOFTWARE INTRERRUPT 3 VECTOR
```

```
00055 F02E      0002      SW12   RMB   2      *SOFTWARE INTERRUPT 2 VECTOR
00056 F030      0002      FIRQ   RMB   2      *FAST INTERRUPT VECTOR
00057 F032      0002      IRQ    RMB   2      *INTERRUPT VECTOR
00058 F034      0002      SWI    RMB   2      *SOFTWARE INTERRUPT 1 VECTOR
00059 F036      0002      NMI    RMB   2      *NON MASKABLE INTERRU T VECT
00060 F038      0002      OUTVCT RMB   2      *OUTPUT VECTOR
00061 F03A      0002      INVCT  RMB   2      *INPUT VECTOR
00062 F03C      0002      BKVCT  RMB   2      *CHECK BREAK VECTOR
00063 F03E      0002      ECHOVT RMB   2      *ECHO VECTOR
00064 F040      0002      PRTINT RMB   2      *PRINTER INIT VECTOR
00065 F042      0002      PRTOUT RMB   2      *PRINTER OUTPUT VECTOR
00066 F044      0002      PRTCLS RMB   2      *PRINTER CLOSE VECTOR
00067 F046      0001      ACIAT1 RMB   1      *ACIA STATUS TEMP
00068 F047      0001      ACIAT2 RMB   1      *ACIA STATUS TEMP 2
00069 F048      0002      XFRADD RMB   2      *TRANSFER ADDRESS
00070 F04A      0002      TLTEMP RMB   2      *TAPE LOAD I/O VECTOR TEMP
00071 F04C      0002      TPTEMP RMB   2      *TAPE PUNCH I/O VECTOR TEMP
00072 F04E      0002             RMB   2
00073 F050      0020      LINBUF RMB   32     *COMMAND LINE BUFFER
00074 F070      0010      MINIPL RMB   16
00075 F080      0002      NEXT   RMB   2      *NEXT LINE TO BE ERASED
00076 F082      0001      SCRL   RMB   1      *SCROLL FLAG
00077 F083      0001      FLAG   RMB   1      *LAST CHAR RCVD BY KEYBOARD
00078 F084      0001      MASK   RMB   1      *MASK FOR GRAPHICS
00079 F085      0001      CCPRT  RMB   1      *MASK FOR CONTROL CHAR PRINT
00080 F086      000A      WINDEX RMB   10
00081 F090      0204      MNDIR  RMB   516
00082                       *
00083                       *
00084                       *
00085                       *
00086                       *
00087                       *
00088 F800                  ORG   $F800
00089 F800 7E F956    4 INIT1  JMP   INIT     *INITIALIZE VIDEO
00090 F803 7E F8DC    4 OUT1   JMP   VIDOUT   *DISPLAY 1 CHAR ON SCREEN
00091 F806 7E F932    4 KEY1   JMP   KEYIN    *GET ONE CHAR FROM KEYBOARD
00092 F809 7E F94B    4 CKBRK1 JMP   CKBRK    *CHECK FOR BREAK
00093                       *
00094 F80C 34   14    7 VIDOUT PSHS  B,X      *START OF VIDEO OUTPUT
00095                       *
00096 F80E E1   08    2        CMPA  #$8      *BACKSPACE
00097 F810 1027 00B8  6        LBEQ  BS
00098 F814 81   0D    2        CMPA  #$D      *CARRIAGE RETURN
00099 F816 1027 00E2  6        LBEQ  CR
00100 F81A 81   0A    2        CMPA  #$A      *LINE FEED
00101 F81C 1027 00BB  6        LBEQ  LF
00102 F820 81   1A    2        CMPA  #$1A     *CLEAR SCREEN?
00103 F822 1027 00DE  6        LBEQ  HUEP
00104 F826 81   0B    2        CMPA  #$B      *VERTICAL TAB?
00105 F828 1027 00B8  6        LBEQ  VT
00106 F82C 81   0F    2        CMPA  #$F      *TURN ON GRAPHICS
00107 F82E 1027 008C  6        LBEQ  GON
00108 F832 81   0E    2        CMPA  #$E      *TURN OFF GRAPHICS
00109 F834 1027 0086  6        LBEQ  GOFF
00110 F838 81   0C    2        CMPA  #$C      *NON DESTRUCTIVE SPACE
00111 F83A 27   26    3        BEQ   FF
00112                       *
00113 F83C B5   F085  5        BITA  CCPRT    *MASK OFF CONTROL CHAR
00114 F83F 1027 00D9  6        LBEQ  OUT
00115 F843 8A   F084  5        ORA   MASK     *GRAPHICS MASK
00116                       *
00117 F846 34   02    5        PSHS  A        *SAVE CHAR
00118 F848 B6   DFCD  5        LDA   CURV     *GET VERTICAL POSITION
00119 F84B BE   D800  3        LDX   #BASE    *GET START OF RAM
00120 F84E 4A         2 B1     DECA           *LAST VERTI AL ROW?
00121 F84F 2B   05    3        BMI   B3       *YES
00122 F851 C6   50    2        LDB   #80
00123 F853 3A         3        ABX
00124 F854 20   F8    3        BRA   B1
00125 F856 F6   DFC   5 B3     LDB   CURH
00126 F859 3A         3        ABX
00127 F85A 1F   10    6        TFR   X,D
00128 F85C C0   02    2 B5     SUBB  #2
00129 F85E 24   01    3        BCC   B6
00130 F860 4A         2        DECA
00131 F861 1F   01    6 B6     TFR   D,X
00132 F863 35   02    5        PULS  A
00133 F865 A7   84    4        STA   0,X
00134 F867 7C   DF    7 FF     INC   CURH     *MOVE CURSOR LEFT ONE SPACE!
00135 F86A B6   DFCC  5        LDA   CURH
00136 F86D 81   51    2        CMPA  #81      *END OF LINE?
00137 F86F 1027 00A9  6        LBLE  OUT
00138 F873 86   02    2        LDA   #2       *SCROLL R UTINE
00139 F875 B7   DFCC  5        STA   CURH     *MOVE CURSOR
00140 F878 B6   DFCD  5        LDA   CURV     *GET VERTICAL PO ITION
00141 F87B 81   0F    2        CMPA  #$F      *BOTTOM OF SCREEN
00142 F87D 26   14    3        BNE   SCROLL   *NO
00143 F87F 8E   D800  3 FF1    LDX   #BASE    *SET UP NEXT LINE ERASE
00144 F882 BF   F080  6        STX   NEXT
00145 F885 7F   F082  7        CLR   SCRL     *SET SCROLL FLAG
00146 F888 7C   F082  7        INC   SCRL
00147 F88B 86   00    2        LDA   #0
00148 F88D B7   DF D  5        STA   CURV     *MOVE CURSOR BOTTOM
00149 F890 16   000A  5        LBRA  EOL
00150 F893 7C   DFCD  7 SCROLL INC   CURV     *MOVE CURSOR DOWN 1
00151 F896 B6   F082  5        LDA   SCRL     *SCROLL?
00152 F899 1027 007F  6        LBEQ  OUT      *NO
00153 F89D BE   F080  6 EOL    LDX   NEXT     *ERASE TO END OF LINE
00154 F8A0 C6   50    2        LDB   #80      *1 LINE
00155 F8A2 86   20    2        LDA   #' '     *CLEAR
00156 F8A4 A7   80    6 EOL1   STA   0,X+     *CLEAR NEXT
00157 F8A6 5A         2        DECB
00158 F8A7 26   F8    3        BNE   EOL1     *END?
00159 F8A9 BF   F080  6        STX   NEXT     *YES
00160 F8AC 7C   DFC6  7        INC   BOTLNE   *SCROLL
00161 F8AF B6   DFC6  5        LDA   BOTLNE
00162 F8B2 81   10    2        CMPA  #$10     *OUT OF RAM?
00163 F8B4 26   05    3        BNE   SCRO1    *NO
00164 F8B6 86   00    2        LDA   #0       *YES *SCROLL FROM TOP MEMOI
00165 F8B8 B7   DFC6  5        STA   BOTLNE
00166 F8BB 35   14    7 SCR01  PULS  B,X
00167 F8BD 39         5        RTS
00168                       *
00169                       *
00170 F8BE 86   80    2 GON    LDA   #$80     *TURN ON GRAPHICS
00171 F8C0 B7   F084  5        STA   MASK
00172 F8C3 35   14    7        PULS  B,X
00173 F8C5 39         5        RTS
00174                       *
00175 F8C6 7F   F084  7 GOFF   CLR   MASK     *TURN OFF GRAPHICS
00176 F8C9 35   14    7        PULS  B,X
00177 F8CB 39         5        RTS
00178                       *
00179 F8CC 86   DFCC  5 BS     LDA   CURH     *GET  OSITION
00180 F8CF 81   02    2        CMPA  #2       *AT LEFT MARGIN?
00181 F8D1 1027 0047  6        LBEQ  OUT      *YES IGNORE
00182 F8D5 7A   DFCC  7        DEC   CURH     *MOVE CURSOR LEFT 1
00183 F8D8 35   14    7        PULS  B,X
00184 F8DA 39         5        RTS
00185                       *
00186 F8DB 86   DFCD  5 LF     LDA   CURV     *GET VERTICAL POSITION
00187 F8DE 81   0F    2        CMPA  #$F      *OUT OF RAM?
00188 F8E0 1026 FFAF  6        LBNE  SCROLL   *NO
00189 F8E4 16   FF98  5        LBRA  FF1      *YES *SCROLL FROM TOP OF R
00190                       *
00191 F8E7 B6   DF D  5 VT     LDA   CURV     *GET POSITION
00192 F8EA 81   00    2        CMPA  #0       *TOP OF RAM?
00193 F8EC 27   06    3        BEQ   VT1      *YES *MOVE TO BOTTOM OF RA
00194 F8EE 7A   DFCD  7        DEC   CURV     *MOVE UP 1 LINE
00195 F8F1 35   14    7        PULS  B,X
00196 F8F3 39         5        RTS
00197 F8F4 86   0F    2 VT1    LDA   #$F      * CROLL FROM TOP OF RAM
00198 F8F6 B7   DFCD  5        STA   CURV
00199 F8F9 35   14    7        PULS  B,X
00200 F8FB 39         5        RTS
00201                       *
00202 F8FC 86   02    2 CR     LDA   #2       *CARRIAGE RETURN ROUTINE
00203 F8FE B7   DFCC  5        STA   CURH
00204 F901 35   14    7        PULS  B,X
00205 F903 39         5        RTS
00206                       *
00207                       *
00208 F904 8D   19    7 HUEP   BSR   HOUP1    *CLEAR  CREEN
00209                       *
00210 F906 8D   03    7 EEOF   BSR   EEOF1    *ERASE TO END OF FRAME
00211 F908 35   14    7        PULS  B,X
00212 F90A 39         5        RTS
00213 F90B 86   20    2 EEOF1  LDA   #' '     *CLEAR
00214 F90D 8E   0 00  3        LDX   #BA E     *START
00215 F910 A7   84    4 EEOF2  STA   0,X      *CLEAR NEXT
00216 F912 30   01    5        INX
00217 F914 8C   DCFF  4        CPX   #BOT     *BOTTOM?
00218 F917 26   F7    3        BNE   EEOF2
00219 F919 39         5        RTS
00220                       *
00221 F91A 8D   03    7 HOUP   BSR   HOUP1    *HOME UP
00222 F91C 35   14    7 OUT    PULS  B,X
00223 F91E 39         5        RTS
00224                       *
00225                       *
00226 F91F 86   02    2 HOUP1  LDA   #2       *LEFT MARGIN
00227 F921 B7   DFCC  5        STA   CURH     *SET UP CURSOR
00228 F924 86   00    2        LDA   #0       *TOP OF MEMORY
00229 F926 B7   DFCD  5        STA   CURV     *CURSOR VERTICAL
00230 F929 86   0F    2        LDA   #$F      *BOTTOM OF MEMORY
00231 F92B B7   DFC6  5        STA   BOTLNE   *SCROLL START
00232 F92E 7F   F082  7        CLR   SCRL     *CLEAR SCROLL FLAG
00233 F931 39         5        RTS
00234                       *
00235                       *
00236                       *
00237 F932 34   04    5 KBYIN  PSHS  B        *SAVE B
00238 F934 B6   F7FC  5 INCH   LDA   KEYRT     *GET CHAR
00239 F937 2B   0B    3        BMI   NONE     *STROBE?
00240 F939 B1   F083  5        CMPA  FLAG     *YES *SAME AS LAST?
00241 F93C 27   F6    3        BEQ   INCH     *YES
00242 F93E B7   F083  5        STA   FLAG     *SAVE AS LAST CHAR
00243 F941 35   04    5        PULS  B
00244 F943 39         5        RTS
00245                       *
00246 F944 86   FF    2 NONE   LDA   #$FF     *CLEAR LAST CHR
00247 F946 B7   F083  5        STA   FLAG
00248 F949 20   E9    3        BRA   INCH
00249                       *
00250 F94B B6   F7FC  5 CKBRK  LDA   KEY RT
00251 F94E 2B   03    3        BMI   CK1
00252 F950 1A   01    3        SEC
00253 F952 39         5        RTS
00254 F953 1C   FE    3 CK1    CLC
00255 F955 39         5        RTS
00256                       *
00257 F956 4F         2 INIT   CLRA
00258 F957 B7   DFCA  5        STA   BASE+$7CA  *RESET VIDEO CONTROLLER
00259 F95A B7   DFCE  5        STA   BASE+$7CE  *SET UP TIMING CHAIN
00260 F95D 86   65    2        LDA   #$65
00261 F95F B7   DFC0  5        STA   BASE+$7C0  *HORIZONTAL LINE COUNT
00262 F962 86   64    2        LDA   #$64
00263 F964 B7   DFC1  5        STA   BASE+$7C1  *INTERLACE H SYNC
00264 F967 86   60    2        LDA   #$60
00265 F969 B7   DFC2  5        STA   BASE+$7C2  *ROW SCAN CHAR
00266 F96C 86   8F    2        LDA   #$8F
00267 F96E B7   DF 3  5        STA   BASE+$7C3  *ROW FRAME
00268 F971 86   03    2        LDA   #$03
00269 F973 B7   DFC4  5        STA   BASE+$7C4  *LINE FRAME
00270 F976 86   20    2        LDA   #$20
00271 F978 B7   DF 5  5        STA   BASE+$7C5  *VERT START
00272 F97B 86   0F    2        LDA   #$0F
00273 F97D B7   DFC6  5        STA   BASE+$7C6  *LAST ROW
00274 F980 86   00    2        LDA   #0
00275 F982 B7   DFCA  5        STA   BASE+$7CA  *R SET VIDEO CONTROLLER
00276 F985 B7   D CE  5        STA   BASE+$7CE  *START TIMING CHAIN
00277 F988 86   1A    2        LDA   #$1A      *CLEAR S REEN
00278 F98A 17   FE7F  9        LBSR  VIDOUT
00279 F98D 7F   F084  7        CLR   MA X      *TURN OFF GRAPHICS
00280 F990 86   80    2        LDA   #$80
00281 F992 B7   F085  5        STA   CCPRT     *DON'T PRINT CNTRL CODE
00282 F995 7F   F082  7        CLR   SCRL
00283 F998 8E   F806  3        LDX   #KEY1
00284 F99B BF   F03A  6        STX   INVCT
00285 F99E 8E   F803  3        LDX   #OUT1
00286 F9A1 BF   F038  6        STX   OUTVCT
00287 F9A4 8E   F809  3        LDX   #CKBRK1
00288 F9A7 BF   F03C  6        STX   BKVCT
00289 F9AA 39         5        RTS
00290                       *
00291                       *
00292           0000          END
```

Sphere Basic

W. H. Johnson
1838 Willowhurst
Cleveland, OH 44112

If you have somehow acquired a Sphere microcomputer and have been in the dumps because you couldn't run basic then this article is for you. If you saw my previous article on making a Sphere into thinking it is a SWTPC machine but aren't sure you want to do all of that work then this program patch will allow you to run SWTPC 4K basic without any hardware changes.

First some points you should be aware of, if you have an original Sphere you will find that the Stack is set at 0200 hex which is right in the middle of SWTPC basic. Depending on which cruddy set of EPROMs you were supplied with if you get a SWI it will reset your stack pointer, so if you lose the program examine the stack pointer and see if that is the trouble. On my system I set it to A015 but you can set anywhere convenient. If you are using this patch use 4FFF which is the top of memory. If you don't have this much memory you can change the program by changing the high byte all the extended addresses in the patch ie,4818,4819,483),4858,485B,485F,4866,4867, 486A,4871,4874,4886,4892, and 4895 from let us say 48 to 38 so that your patch now extends from 37FE to 3FFF top of stack. This program uses no page 0 addresses because SWTPC basic uses this page for line numbers and pointers as well as the Basic buffer storage. If want to try and use Sphere only routines the screen pointers will mess up the line counters.

Do not jump to the 0100 hard start unless you have set location 0044 and 0045 to limit the memory to just under your patch area ie 476D or the basic will wipe out everything, the interpreter clears all non-used memory at start-up to prevent any random garbage from entering the stack area. The basic tape comes with a very nice little instruction book detailing operation and reference pointers. This is truly a nice buy for the price. I would also like to mention that I have seen letters saying how bad tapes supplied by SWTPC and others were but I have bought several different versions of most of the tapes over a two year interval and have never had a problem with any (this includes 4K basic Ver 1.2.0,8K Basic Ver 1.2.0,2.) Correx Disassembler): the people with problem tapes had faulty interfaces, had really out of alignment recorders or misc non-tape problems.

OK, you've got the stack pointer set, the next event is to load the basic into the machine. You can either load it using my tape input routine to read SWTPC and Motorola format tapes (ASCII versions please) or load it in by hand from a source listing (See Interface Age Magazine May 1977). You might have to load the program a little past the beginning so it doesn't wipe out your Sphere pointers in page 0 but this depends on which version you get. Once in the machine make your own copy using your tape format which includes all of the patches and doesn't disturb your page 0 pointers. The locations up to 00FF are not used until you start up the interpreter except for location 0044 mentioned before. Here are the patches needed:

```
0272  7E 4855
0275  7E 4863
027A  7E 4817
027D  BD 4870
02AA  7E 483B
08FB  7E FF6A
```

Some further changes that will depend on your system are the vectored addresses that follow the command table from 0110 to 0210

```
0135  Address routine jumps to on Save
012F  Address routine jumps to on Load
0129  Address routine jumps to on Patch in mine FF6A
```

As an afterthought check your memory map to see if you have one of the first spheres which had a different keyboard address (this one is for FF68,FF41.) If it is not the same change the input character routine to reflect your address. You will be surprised to see how fast this runs on your machine as compared to a SWTPC 6800 as you are no longer limited to 300 baud (or even 19000 baud). Your input/output is now at full machine speed, (and if you change out those 1702's you can up the clock speed to 2 MHz. If you want to mess up some of your TRS and PET owner minds write up a bunch of physics problems using factors of 10 exponent -99 and 10 exponent +99 and ask them to run the problems on their machines. Another neat one is set up a loop counter to stop when the value is = (not greater or = but =) 123456789. This will blow up most base 2 interpreters and it will run forever in most cases. (SWTPC basic is BCD). I understand there is a basic for Sphere machines from Programma International but I have no experience but you might check them for other Sphere software. I have a whole notebook full of old software I wrote for the Sphere over 2 years ago including a writeup of their =16K extended Basic= which can multiply 2 3-digit numbers and be off by 10,000. I suppose if there was any interest I could make these available but all my current programming efforts are with SWTPC and TRS-80 formats. Hope you can extend your Sphere of influence.

```
                    HEX TO ASCII CONVERSION
4800  A6 00     Left half of character to ASCII
4802  8D 05     to 4809
4804  A6 00     Right half of character to ASCII
4806  08
4807  20 04
4809  44
480A  44
480B  44
480C  44
480D  84 0F     And with 0F to get rid of extra bits
480F  8B 30     Add 30
4811  81 39     Compare to 39 is it a hex A-F
4813  23 02
4815  8B 07     If so add 7

                    OUT 1 CHARACTER
4817  9F 47FE   Save program X
481A  FE 4790   Get screen pointer
481D  81 FF     See if rubout character
481F  27 36     to 4857
4821  81 15     See if SWTPC special cursor character,if so ignore
4823  27 2E     to 4857
4825  81 0A     See if line feed character
4827  27 25     to 4857
4829  81 0D     See if carriage return
482B  27 08     to 4835
                    DISPLAY CHARACTER ON CRT
482D  A7 00     Store on screen
482F  08        Increment screen pointer
4830  FF 4790   Store updated screen pointer
4833  8C E200   See if at top of screen
4836  23 1F     If not to exit 4857
4838  36        Save A
4839  37        Save B
483A  CE E000   Load top of screen
483D  A6 20     Start scroll
483F  A7 00
4841  08        Next address
4842  8C E1A0   See if at last line yet
4845  26 F6     Lopp back if not done


4847  CE E1E0 Clear the last line
484A  C6 20     Load B with space character counter
484C  86 20     Load A with space character
484E  A7 00     Store space on screen
4850  08        next screen address
4851  5A        Decrement counter
4852  26 FA     Loop back if whole line not clear
4854  CE E1E0   Point to end of last line
4857  FF 4790 Store new screen pointer
485A  FE 47BE Get original program X
                    OUT 2 HEX CHARACTERS
485E  97 4792 Store B
4861  20 06

                    OUT 4 HEX CHARACTERS
4863  97 4792 Save B
4866  8D 4800 Out first 2 characters
4869  8D 4800 out second 2 characters
486C  D6 4092 Reload B
486F  39        RTS
                    IN 1 CHARACTER FROM KEYBOARD
4870  9F 47BE Save program X
4873  FE 4790 Get Screen Address
4876  63 00     Compliment
4878  CE 26F0 Cursor counter value
487B  09        Decrement counter
487C  27 05     to 4883 if not timed out
487E  86 40     PIA test value
4880  B5 F041 Test if character in
4883  27 F6     to 487B if not
4885  FE 4790 Get screen address
4888  A6 00
488A  2A 02
488C  63 00
488E  B6 F040 Load character from PIA
4891  8D 4820 to display character
4894  FE 47BE Load program X
4897  39        RTS
```

```
                READ SWTPC TAPES ON SPHERE

3100  8E 47FF   Set Stack Pointer8
3103  BD F877   Turn on recorder
3106  86 40
3108  B5 F041   See if keyboard input
310B  27 06     If not get tape character
310D  BD F880   If keyboard input stop recorder and
3110  7E F864   Jump to monitor
3113  BD F87E   Input a tape character
3116  81 53     Look for start of tape
3118  26 EC     to 3106
311A  BD F87E   Input a tape character
311D  81 39     See if tape record over
311F  27 24     to exit
3121  81 31     See if start of record yet
3123  26 E1     to 3106
3125  7F 478A   Clear register
3128  BD 3150   Input a character
312B  80 02     Subtract 2 from checksum
312D  B7 478B   Store checksum
3130  BD 3168   Build address
3133  BD 3150
3136  7A 4788
3139  27 05
313B  A7 00
313D  08
313E  20 F3
3140  7C 478A
3143  27  C1    to 3133
3145  BD F880   Turn off tape if done
3148  7E F864   Return to monitor
314B  DF 44
314D  BD 3179   Convert ASCII to hex
3150  48
3151  48
3152  48
3153  48  ASL A ASL A
3154  16  TAB
3155  BD 3178
3158  1B  ABA
3159  16  TAB
315A  FB 478A   Add B
315D  F7 478A   Sto B
3160  DE 44
3162  39        RTS

3163  BD 3150
3166  B7 478C
3169  BD 3150
316C  B7 478D
316F  FE 478C
3172  39

                CONVERT ASCII TO HEX CHARACTERS
3173  BD F87E   Get ASCII character
3176  80 30     Subtract 30
3178  2B 0F     BMI 3189
317A  81 09     Is it greater than a number 0-9
317C  2F 0A     BLE 3188
317E  81 11
3180  2B 07     BMI 3189 not 0-9 or A-F
3182  81 16     See if not hex (too large)
3184  2E 03     BGT 3189
3186  80 07     SUB A 07
3188  39        RTS
                BACK TO MONITOR IF NOT HEX (I.E. ERROR)
3189  BD F880   Turn off recorder
318C  7E F864   Jump tommonitor
```

P.O.BOX 1601
PORT ISABEL
TEXAS 78578
NOV 5 79

DON WILLIAMS
'68' MICRO JOURNAL
HixSON TN 37343

Dear Don

Here is a little routine for use with TSC-BASIC, that lets you round to two places, and print using decimal adjust. this will let the users of TSC-BASIC use it on small business routines, that need to print in dollars and cents, and not in six digits.

Also in playing with TSC-BASIC, I found that it will allow a limited amount of pretty print, as in for-next loops, it has a lot of power, and I hope that the '68' MICRO JOURNAL readers will share their knowledge and findings with each other, that is what has made the '6800' so much better than the other systems,

I also hope that every one doesn't change over to the '6809' and create the same problem that happened to the 8080 and the Z-80 groups.

The '68' MICRO JOURNAL is looking great and is getting the word out to the '68xx' users. keep up the good work.

I think that the basic program has enough comments to run barefoot, if you want to run it.

Happy Computing
Jim Caldwell

-1-

```
1 REMARK *  THIS ILLUSTRATES A DIGITS=2
2 REMARK *  ROUND UP AND DECIMAL ADJUST
3 REMARK *  ROUTINE FOR USE WITH TSC BASIC
4 REMARK *  NOTE THAT TSC BASIC ALLOWS
5 REMARK *  A LIMITED AMOUNT OF PRETTY PRINT
6 REMARK *  ON FOR-NEXT ROUTINES
7 REM++JIM CALDWELL BOX 1601
8 REM++PORT ISABEL TX 78578
9 REMARK *  HOME AND CLEAR CT-1024
10 CL$=CHR$(16)+CHR$(22):PRINT CL$
20 PRINT@0,"RANDOM NUMBER";"    /100+ROUND UP"
25 REMARK *  GET THE NUMBERS
30  FOR T=1TO 10
40   RN=RND(0)*1000
50   DN=AN/100+.005
60    WN=RN
70    GOSUB 130:PN$=AN$
80    WN=DN
90    GOSUB 130:DN$=AN$
100   GOSUB 200
110  NEXT T
120 GOTO 230
130 REMARK *  DIGITS=2 ROUTINE
140 WN=WN+.0001
150 WN$=STR$(WN)
160  FOR DG=1 TO LEN(WN$)
170   IF MID$(WN$,DG,1)="." THEN AN$=LEFT$(WN$,DG+2) ELSE 190
180   RETURN
190  NEXT DG
200 REMARK *  DECIMAL ADJUST
210 PRINT @0,TAB(10-LEN(PN$));PN$;TAB(30-LEN(DN$));DN$
220 RETURN
230 END OF ROUTINE
```

RANDOM NUMBER	/100+ROUND UP
641.30	6.41
173.28	1.73
361.46	3.61
535.31	5.35
41.46	.41
615.01	6.15
443.40	4.43
510.69	5.11
738.00	7.38
929.61	9.30

I am sure by now that a lot of comments have crossed your desk about 'TSC BASIC', but here is another one).

Trying to convert old SWTPC BASIC programs to TSC BASIC you find that some of the old operating features have been lost, like DIGITS, and the BINARY math does funny things to programs that handle messy matters,

Here is a way to handle some of the two digit problems, but you must watch carefully that you dont lose or gain a 4th place number, and have it foul up your program.

In this excert, I found that I was losing .000001 after a few counts (83) and then gaining them back, and then losing it again. It sure can foul up a program that is working in small numbers.

Here is a way to get around the last digit, and also get back to a 'DIGITS=2' listing, (people like to see money listings with two decimal places)

Hope this will save someone a little time and clean up a listing.

Jim Caldwell
Box 1401
Port Isabel Tx 78578

```
10 REM    JIM CALDWELL
20 REM    BOX 1401
30 REM    P  T ISABEL TX 78578
40 REM
50 REM    PURPOSE OF PROGRAM IS TO CORRECT
60 REM    ERROR IN FOR-NEXT COUNT CAUSED
70 REM    BY BINARY MATH IN TSC-BASIC
80 REM    TT WOULD BE USED IN A PROGRAM
90 REM    VERSUS THE 'T' COUNT
100 REM    AND 'RR$' WOULD BE OUTPUT
110 REM    TO A PRINTER USING TWO DECIMAL PLACES
120 REM
130 REM
140 REM    THREE NUMBER SYSTEMS
150 REM
160 REM
170 REM    T  =ERROR IN FOR-NEXT COUNT
180 REM    TT =CORRECTED COUNT
190 REM    RR$=CORRECTED COUNT WITH TWO DECIMAL PLACES
195 REM
200 OPEN "O.PRINT" AS 0
205 FOR S=1TO3:PRINT #0:NEXT S
210 POKE 44041,0:REM    CLEAR PAUSE
220 PRINT #0,TAB(20);CHR$(27);CHR$(108)
230 PRINT #0,"T","TT","RR$"
240 PRINT #0
250 FOR T=0 TO 1 STEP .01
260 S=T+.000002
270 R$=STR$(R)
280 RR$=MID$(R$,1,4)
290 TT=VAL(RR$)
300 IF T<.7 THEN 320
310 PRINT #0,T,TT,RR$
320 NEXT T
3 0 PRINT #0,CHR$(27);CHR$(120)
340 CLOSE 0
350 END
```

T	TT	RR$
.71	.71	.71
.72	.72	.72
.73	.73	.73
.74	.74	.74
.75	.75	.75
.76	.76	.76
.77	.77	.77
.78	.78	.78
.79	.79	.79
.8	.8	.80
.81	.81	.81
.82	.82	.82
.83	.83	.83
.839999	.84	.84
.85	.85	.85
.859999	.86	.86
.87	.87	.87
.879999	.88	.88
.889999	.89	.89
.899999	.9	.90
.909999	.91	.91
.919999	.92	.92
.929999	.93	.93
.939999	.94	.94
.949999	.95	.95
.959999	.96	.96
.969999	.97	.97
.979999	.98	.98
.989999	.99	.99
.999999	1	1

***** CLASSIFIED ADVERTISING *****

For Sale: Two (2) SWTPC MP8 8K memory boards, one with sockets, one without, both working. $200.00 ea. Main logic board from CT-64 with page memory and UART board, $100.00. Doug Beck, 995 Lundy Lane, Los Altos, Ca 94022 415-948-2268

- - -

SWPTC 6800, MF68/2, FLEX 1.0, 20K AC30, CT64, MP-LA, MANUALS, SOCKETS, BOOKS, PROGRAMS $2550 FIRM. 904-375-6926

- - -

Five used good SWTPC 4K Boards. Socketed 21L02-4 $43.50 each. 2-Week returnable. Capt. Tower, 277 7th St., Ogdon,Utah 84404

- - -

SWTPC 6800 System with A-2 Processor and 32K Dynamic Memory -$700.00, AC 30-$60.00 (615-698-5002) David Hanon

*******HELP*******

Dear Sirs,

My CT-64 has a problem I think. When I am entering Data Statements, in particular, the cursor starts drifting to the right on the screen. I am running a SWTPC 6800 AC-30, and SWTPC BASIC. A control "C" stops the cursor drift and returns the program so I can start entering Data again. Is it the CT-64? What can I do to remedy this?

I have ordered a WORLDWIDE ELECTRONICS HARDCOPY DEVICE with ASCII code interface but I have been told a small Driver Machine Language Program is required. Can someone please tell me what this routine is? Or where I can buy it?

Thank You,
Jeffery M. Craig
Apt 912 - 3001 S. King Dr.
Chicago, IL 60616

Ed's Note;

Jeff, The Selectric Driver is avalaible from WORLDWIDE. I know because I wrote it.

DMW

- - -

Dear Sir,

Its kind of frustrating to see all that software available for Pet and TRS-80 systems and us 6800 types can't use it because of the differences between systems. Is it possible for any of our 6800 hardware types to build a board that could read tapes or disks from these systems? It would seem to me that there could be a tremendous market for this sort of thing.

Sincerely,
Joseph A. Goze
1301 Heather Road
Homewood, IL 60430

P.S.- I am particularily interested in some of the commodity price data available for these systems.

- - -

Dear Mr. Williams,

Referring to the "HELP" column in the 68 M.J., I have one question; Do you know a company selling empty 8K-MEMORY BOARDS for the 2102 CHIPS, for the SS50 bus. I know MSI has such boards, but unfortunately they do not sell to end users in Europe, and the MSI dealers do

not have empty boards. I would appreciate any information very much. All I need is the empty card with connector set for SS50.

Many Thanks In Advance.
Raymond Casneuf
Berliner Str. 54
6457 MAINTAL 1
W. Germany/Europe

Ed's Note;
Maybe some of the readers can help us with this request.
DMW

Publishers Remarks, Etc.

ISSUE NUMBER 1

We have available a limited number of issue 1. There is a large demand for all back issues, this one has not been available for awhile.

We will accept prepaid orders ($3.50) including postage and handling, for 30 days. At the end of that time we will ship all orders if there is a sufficient supply on hand. If not we will honor the orders by date of original subscription. This means that those who were earlier subscribers will be given preference. This appears to us the only fair way to handle these.

If you are short some back issues there is two courses you might want to consider. First you can order any back issue (except 1 or 4) for $3.50 and receive as many as we still have. Also we are preparing the entire article content, for the first six months, in one volumn. This we hope to have out after the first of the year. We will be accepting orders for this special issue in the near future. Details on the special issue will be in next months issue.

SWTPC CDS-1 Winchester Disk

We have received our SWTPC winchester disk system from SWTPC. So far it looks fine, more on this in a coming issue, as we are just now in the process of getting it running on a 56K 09 machine. We will have a full report on this system, both hardware and software wise, after we have it running.

68000

Things are happening faster for the coming 68000 than I had originally anticipated. Already we hear of a couple of manufacturers who will install the 68000 on the S100 (ugh!) bus, hopefully the one to be approved (?) by NBS.

For the S50 bus user there is a move underway by GIMIX to install the 68000 on our standard bus. This could allow most of the better parts of the 68000 protocol accessible to the S50 bus users, by the installation of a new CPU card only, plus some motherboard strapping and memory card configuring.

My understanding is that GIMIX is in the planning stage, with most of the hairy problems resolved. It would appear that it will be at least a year before they will have anything available for you and I. They (GIMIX) indicate that the 68000 will address 160K words (16 bit) with extended addressing, by a multiplexing scheme. All this on the standard S50 bus.

My concern is that as this new CPU is being considered for the S50 bus, proper consideration is given by ALL anticipated manufacturers, for compatibility to existing hardware and software. Also of prime importance is that we all be together, as much as is possible, on every aspect of the 68000, for the S50 bus.

While on the subject of GIMIX, I would like to report that at the recent show in Philly, I saw the new GIMIX 32K static memory board in operation, it performed well. One thing that grabbed my attention (and liking) was the current consumption, only about 2 amps. For static RAM this is of importance when considering various power supplies now in use, on S50 bus machines. A more complete overlook will be coming as soon as we receive one for use and review. As far as I know this is the first 64K 'static' memory system for the S50 bus. More will follow, as they become available, I will attempt to keep you informed.

New RS-499 Standards

Coming now are new standards, from NBS, for a replacement to the much used RS-232 standard we all have been using. The trend seems to be for adapters to go inline, these would convert from RS-232 to the newer RS-499 signal interface standard.

Included in the above is the RS-422 and RS-423, these allow longer cable lengths and higher baud rates. Many larger manufacturers are designing these newer standards into their new equipment. There will be a need for adapters to accomplish inline conversions.

The requirements should be well within the scope of an article, by some of our readers, to present thru the pages of 68 Micro Journal™, an article outline the design and use of the new RS-499. This could cover the building of an adapter board for existing hardware. How about it readers, any volunteers?

Refereed Articles

I have been in discussion with various individuals in both the computer and academic fields concern 'refereed articles'. It is my desire to continue to improve the quality of articles published in 68 Micro Journal™. By the use of refereed articles, an input of technical material, of high quality and standard, would be available to our readers. A requirement being that it conform to the interest of our readers.

What is needed now is input from those who have the academic and technical qualifications to accept appointment to a referee board. This board, or at least a portion, would review and evaluate the quality of articles submitted, for refereed publication consideration.

Needed also at this stage of planning is reader reaction to the above. I pledged, from the beginning, to develope this publication around what you the reader desire. Let me know your feelings on this, with any suggestions you might have. Hopefully by enough response to this I can arrive at a decision that will benefit us all.

If we are then to progress to where we will establish a referee board and publish, from time to time, qualified articles, I will need help. I will need qualified board members. also I will need all the information I can collect, concerning the entire undertaking. If you can offer anything to this venture, PLEASE let me know.

DMW

Print.Sys for form feedless printer

Ken Stamm
15 E 91 St.
NYC, NY 10028

If you've been using FLEX 2.0 for the MF-68 Minifloppy, or (as in my case) the identical version supplied with SWTPC's DMAF1 8" drives, you probably appreciate the usefulness of the print spooler feature.

It turns out that the spooling software sends out a formfeed character (hex $0C) after every file printed, so as to start the next file listing on a clean page. Also, the TSC Assembler puts out formfeeds after each page of assembly listing, if you specify the OPT PAG directive. Nothing wrong with this, unless your printer doesn't recognize formfeeds. My LA-36 Decwriter doesn't. Each file printed by the spooler comes out stuck up right after the previous one. Each page of assembly sent to the printer (P,ASMB ...) seems to start at a different place on the sheet. In some cases, you can buy a hardware formfeed option to install on your printer, and all will be well. Except perhaps your budget.

Or, you can do it in software...

This PRINT.SYS driver simulates a formfeed function by monitoring all characters sent to the printer. When it notices a linefeed character ($0A), it decrements a counter (LINCNT) which is set to the number of lines per page whenever a new page starts printing. When a formfeed character ($0C) comes along, it holds up character output and prints as many linefeeds as it takes to get to the top of the next page. In any case, it does nothing special until it sees a formfeed character.

The PRINT.SYS shown here is pretty well ready to assemble and install for serial printers, three or four adaptations may be necessary:

1) The address of the MP-S (or equivalent) ACIA interface running the printer should be specified in the 'ACIA EQU ...' statement.

2) The number of printed lines per page on your paper should be specified in the 'PAGSIZ EQU ...' statement. One notable exception to the 66 lines/page 'standard' is the pin-fed model 43 Teletype. It uses 12" wide by 8.5" long paper and PAGSIZ should EQUal 51 for it.

3) Your printer might want 2 stop bits instead of 1 (remember the model 33 TTY?) If so, changing the 'LDA A $55' in PINIT to 'LDA A $11' should do it.

4) If you dont have memory at $7F00, you'll have to change the ORG statement for POUT1 to somewhere just below the top of your user RAM. The reason for placing POUT in user RAM (admittedly not the most elegant solution) stems from the fact that TSC is rather miserly in handing out room for the PRINT.SYS driver. The 'Advanced Programmer's Guide' allocates only 20 bytes ($ACE4 - $ACF7) for the output routine. Spilling over into $ACF8 - $ACFF ('System Scratch' - ???) was tempting, but for only 8 additional bytes, not worth the risk. If you can find a safe home for POUT outside of user RAM you've got it made (and let me know!). ROM maybe?

This leads to one warning: Certain hungry programs or utilities may try to harm your top of user RAM. This is not a problem if printing is not in progress while the utility is, and PRINT.SYS is not currently needed. (potentially a problem with the P,<FLEX command> case.) Fortunately, very few

utilities in FLEX 2.0 hurt the user RAM, especially near the top. Most dont know where the top of RAM is, anyhow.

The only utility I've found which does hurt the top of RAM, and where keeping PRINT.SYS resident in memory is extremely useful is TSC's new Disk BASIC.

TSC BASIC is easily told where you wish the new ending memory location to be. Simply GET it into memory, set locations $0020 - $0021 to $7EFF (assuming your POUT routine is ORGed at $7F00), and resave it (SAVE BASIC.CMD,0020,35F0,0100). By the way, as shipped from TSC, BASIC's memory end seems to be set to $4FFF. You will probably want to change this value to something else anyway if you have more than 20K of user RAM.

As for SWTPC Disk BASIC, while it too eats up all of user RAM, I have not found any instance when it and PRINT.SYS would have to be resident in memory together. If you have TSC's new BASIC, you won't want to use SWTPC's any more anyway.

When using this PRINT.SYS, simply make sure the top of the page is lined up with the printhead before PRINT.SYS is first invoked. I've found a quick and dirty way of forcing a top of form from FLEX to be: +++P,HECHO C (this assumes you have TSC's HECHO utility... All it does is echo the formfeed character ($0C), in this case to the printer).

```
FORMFEED HANDLING PRINT.SYS          7-22-79  TSC ASSEMBLER  PAGE    1

                        *
                        * DMAF1 FLEX 1.0 OR MF-68 FLEX 2.0
                        * PRINT.SYS DRIVER FOR ACIA AT PORT #2
                        *
                        * MODIFIED (JUL. 79) TO HANDLE TOP-OF-FORM ON FORM FEED ($0
                        * CHARACTER.  SET PAGSIZ EQUATE TO NUMBER OF LINES PER FORM
                        * (CURRENTLY SET TO STANDARD 66 LINES/PAGE).
                        * A PORTION OF THIS PRINT.SYS IS LOCATED AT $7F00.
                        *
                        * (C) 1979 KEN STAMM.  ANYTHING BUT COMMERCIAL USE OK.
                        *
8008            ACIA    EQU     $8008       PRINTER PORT ADDRESS
0 42            PAGSIZ  EQU     66          NUMBER OF LINES/PAGE
                        *
ACC0                    ORG     $ACC0       PRINTER INITIALIZATION
ACC0 86 03      PINIT   LDA A   #$03        RESET ACIA
ACC2 B7 80 08           STA A   ACIA
ACC5 86 55              LDA A   #$55        SET 8 BITS + 1 SB
ACC7 B7 80 08           STA A   ACIA
ACCA B6 AC D1           LDA A   PAGLEN      SET TOF ON CALL
ACCD B7 AC D2           STA A   LINCNT
ACD0 39                 RTS
                        *
AC01 42         PAGLEN  FCB     PAGSIZ
ACD2            LINCNT  RMB     1           LINES REMAINING THIS PAGE
```

```
                        *
ACD8                    ORG     $ACD8       PRINTER READY? ROUTINE
ACD8 36                 PSH A
ACD9 B6 80 08           LDA A   ACIA
ACDC 84 02              AND A   #%0000 0010
ACDE 48                 ASL A
ACDF 48                 ASL A
ACE0 06                 TAP
ACE1 32                 PUL A
ACE2 39                 RTS
                        *
ACE4                    ORG     $ACE4       OUTPUT CHAR TO PRINTER
ACE4 7E 7F 00   POUT    JMP     POUT1
                        *
7F00                    ORG     $7F00       POUT HERE, LACK ROOM AT $ACE4
7F00 BD AC D8   POUT1   JSR     PCHK        PRINTER READY?
7F03 2A FB              BPL     POUT1       NOT YET...
7F05 84 7F              AND A   #$7F        STRIP BIT 8
7F07 81 0A              CMP A   #$0A        IS IT A LINEFEED?
7F09 26 0F              BNE     NOTLF       NOT LINEFEED
7F0B 7A AC D2           DEC     LINCNT      COUNT DOWN 1 LINE
7F0E 26 24              BNE     OUT         WE AT BOTTOM OF PAGE?
7F10 B6 AC D1           LDA A   PAGLEN      YUP. RESET THE LINE COUNTER
7F13 B7 AC D2           STA A   LINCNT
7F16 86 0A              LDA A   #$0A        AND SEND OUT THE LINEFEED
7F18 20 1A              BRA     OUT
7F1A 81 0C      NOTLF   CMP A   #$0C        WAS IT A FORMFEED?
7F1C 26 16              BNE     OUT         NOPE. PRINT WHATEVER IT IS.
7F1E 86 0A              LDA A   #$0A        LOAD UP A LINEFEED
7F20 B7 80 09   LFLOOP  STA A   ACIA+1      SEND IT...
7F23 BD AC D8   LFLOP1  JSR     PCHK        WAIT FOR READY
7F26 2A FB              BPL     LFLOP1
7F28 7A AC D2           DEC     LINCNT      FORMED OUT YET?
7F2B 26 F3              BNE     LFLOOP      NOPE. SEND LF'S TILL WE ARE
7F2D B6 AC D1           LDA A   PAGLEN      THEN RESET THE LINE COUNTER
7F30 B7 AC D2           STA A   LINCNT
7F33 39                 RTS                 AND EXIT
7F34 B7 80 09   OUT     STA A   ACIA+1
7F37 39                 RTS
                        *
                        END

NO ERROR(S) DETECTED

    SYMBOL TABLE:

ACIA   8008   LFLOOP 7F20   LFLOP1 7F23   LINCNT ACD2   NOTLF  7F1A
OUT    7F34   PAGLEN ACD1   PAGSIZ 0042   PCHK   AC08   PINIT  ACC0
POUT   ACE4   POUT1  7F00
```

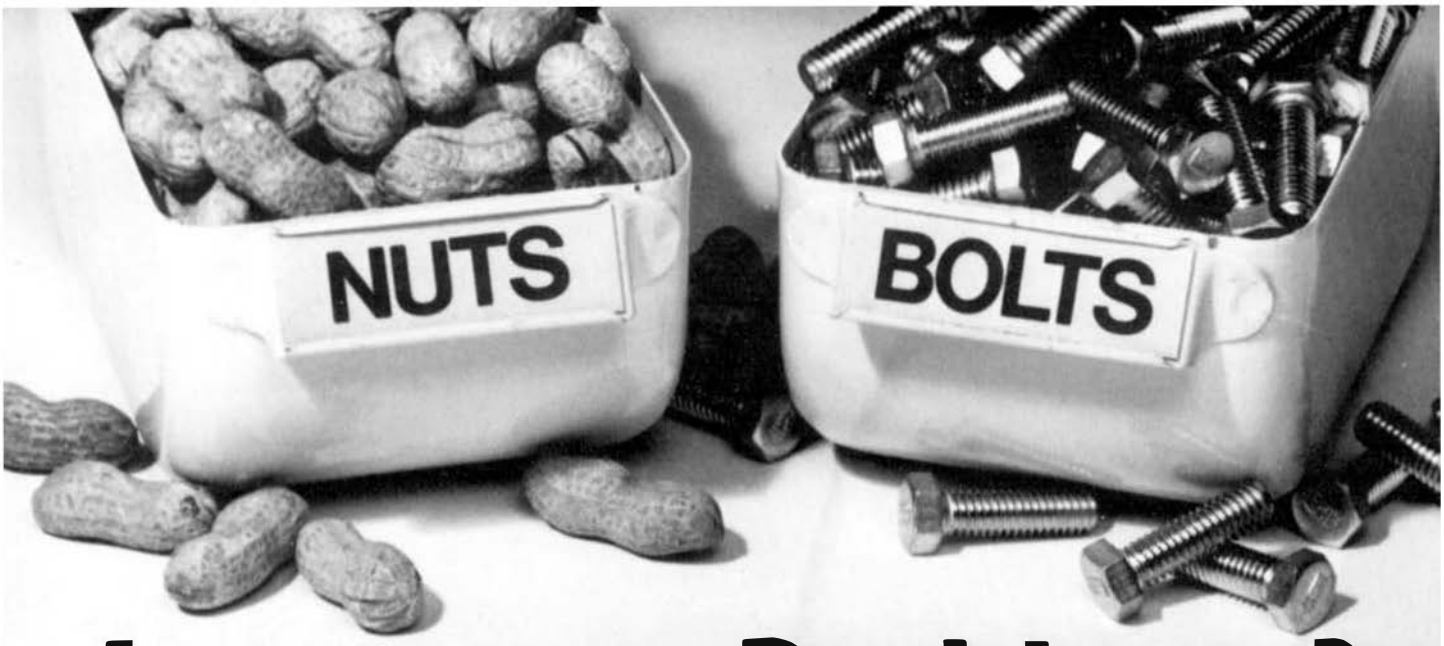
FLEX by T.S.C. seems the way to go for the S.W.T.P. 6800 and the new 6809. The BASIC is very fast and eliminates the slowness we have endured.

We have one complaint and are wondering if anyone has solved it. We have been using the 'SET' command that is in the M.S.I. of Olathe, KS, BASIC Random Disk File handling. You can have several records per sector that are entered sequentialy, but you can get to them randomly. The main thing they are numbered 1,2,3,4,5,6,etc. You can write SET #10 = 6 and you read the sixth entry.

In FLEX RECORD I/O, if you have more than one entry per sector you have to use Sub-Recorda. For instance if you have 3 entries per sector.

Entry	1	is	Record	1,A	not 1
"	2	is	"	1,B	" 2
"	3	is	"	1,C	" 3
"	4	is	"	2,A	" 4
"	5	is	"	2,B	" 5
"	6	is	"	2,C	" 6

This is very confusing and we have been unable to figure a way to get



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at these entries in a reasonable fashion.

I suppose what we are really talking abour is KEYED SEQUENTIAL ACCESS FILES. If our problem with FLEX could be solved, we think FLEX would be unbeatable.

Can anyone HELP us. Thanks!

FRANK C. BARNEY
425 North Bdwy.
Pittsburg, KS
66762

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EDITOR (Name and Address): Same

MANAGING EDITOR (Name and Address): Larry E. Williams 6129 Airways Blvd., Chattanooga, Tn 37421

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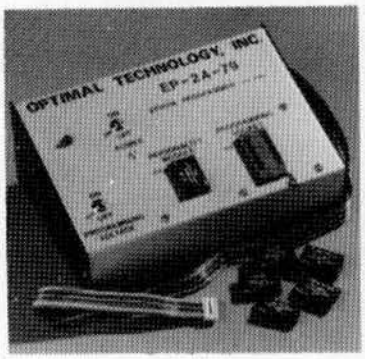

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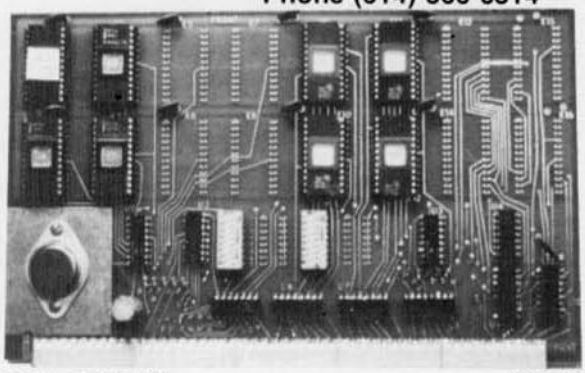

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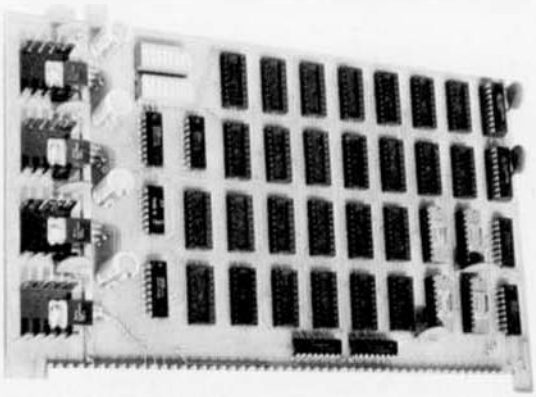

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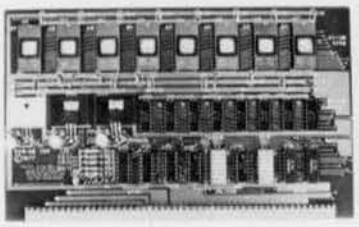
See Gimix Ad on page 4

THE CLASSICS



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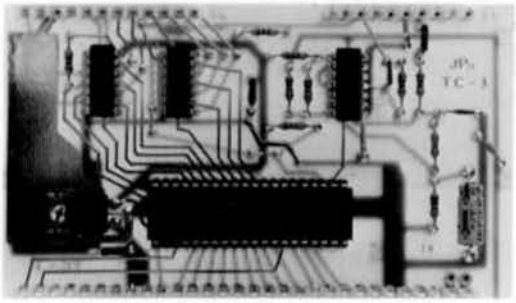

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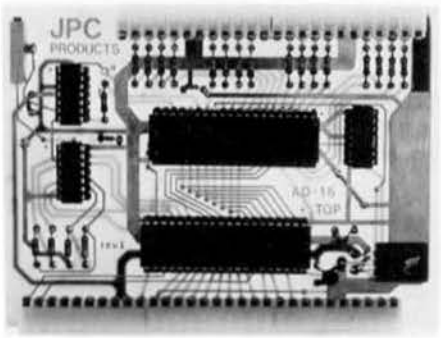

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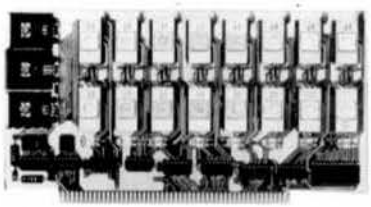

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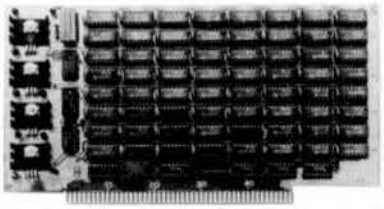

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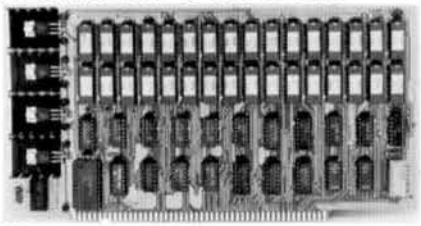

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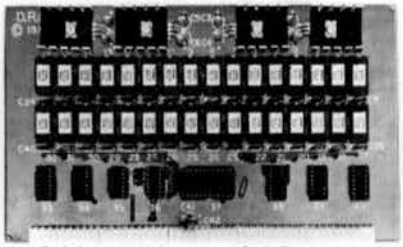

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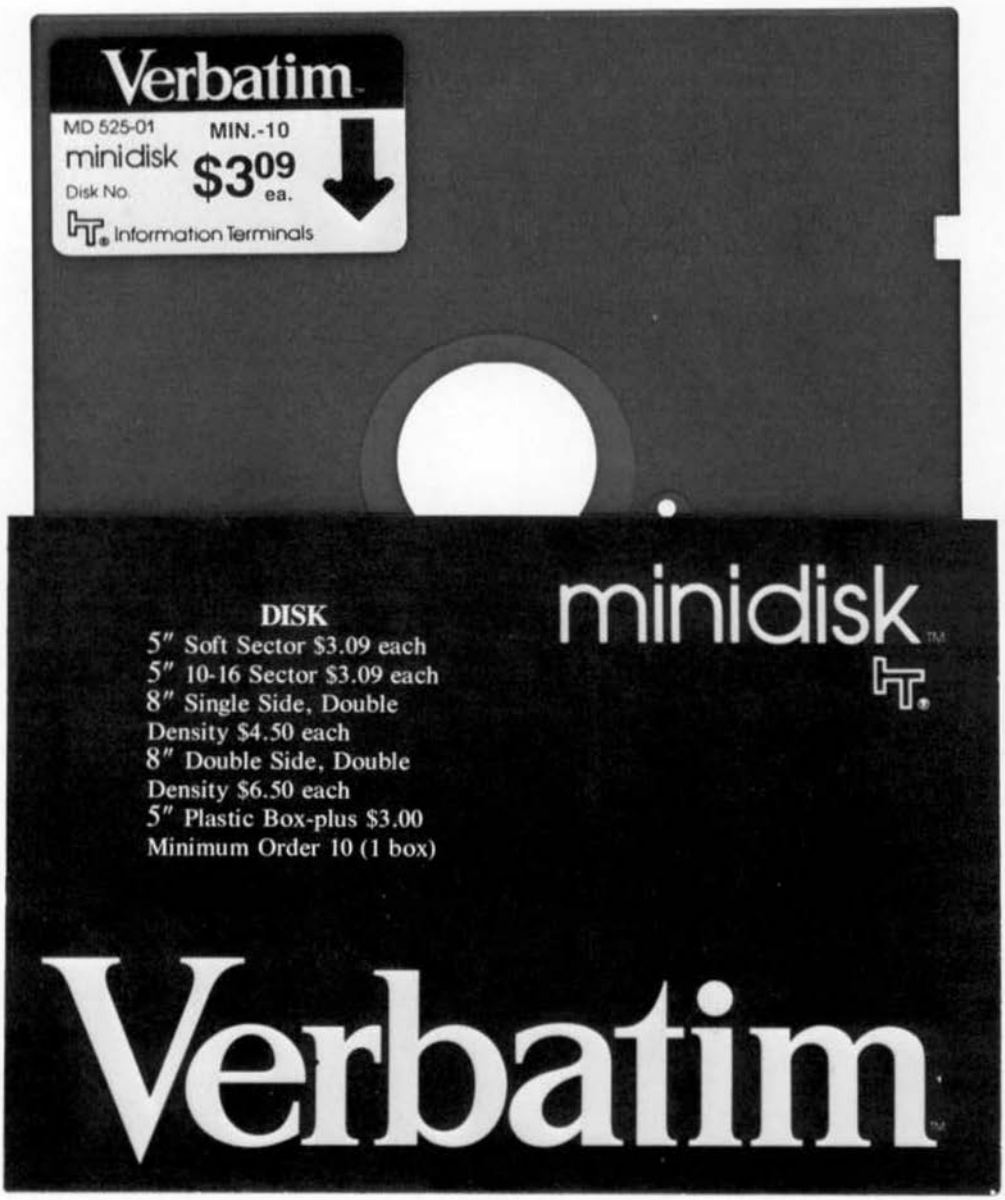

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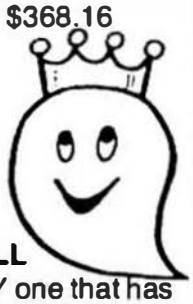

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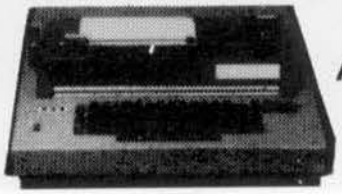
ASCII  ASCII

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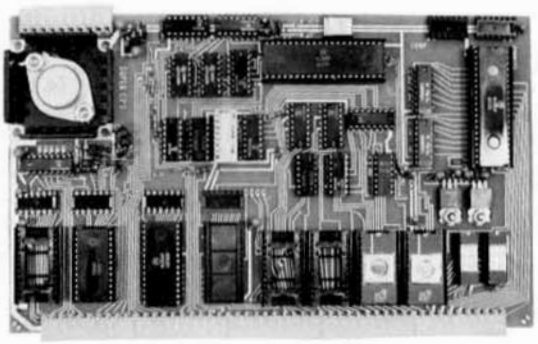

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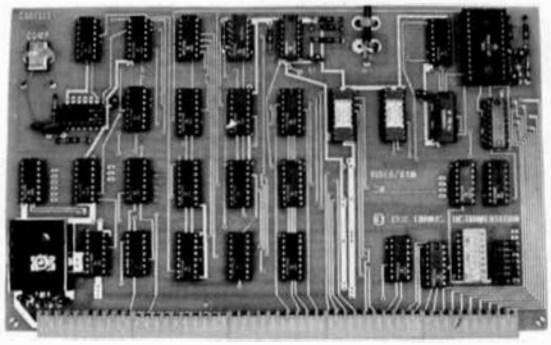

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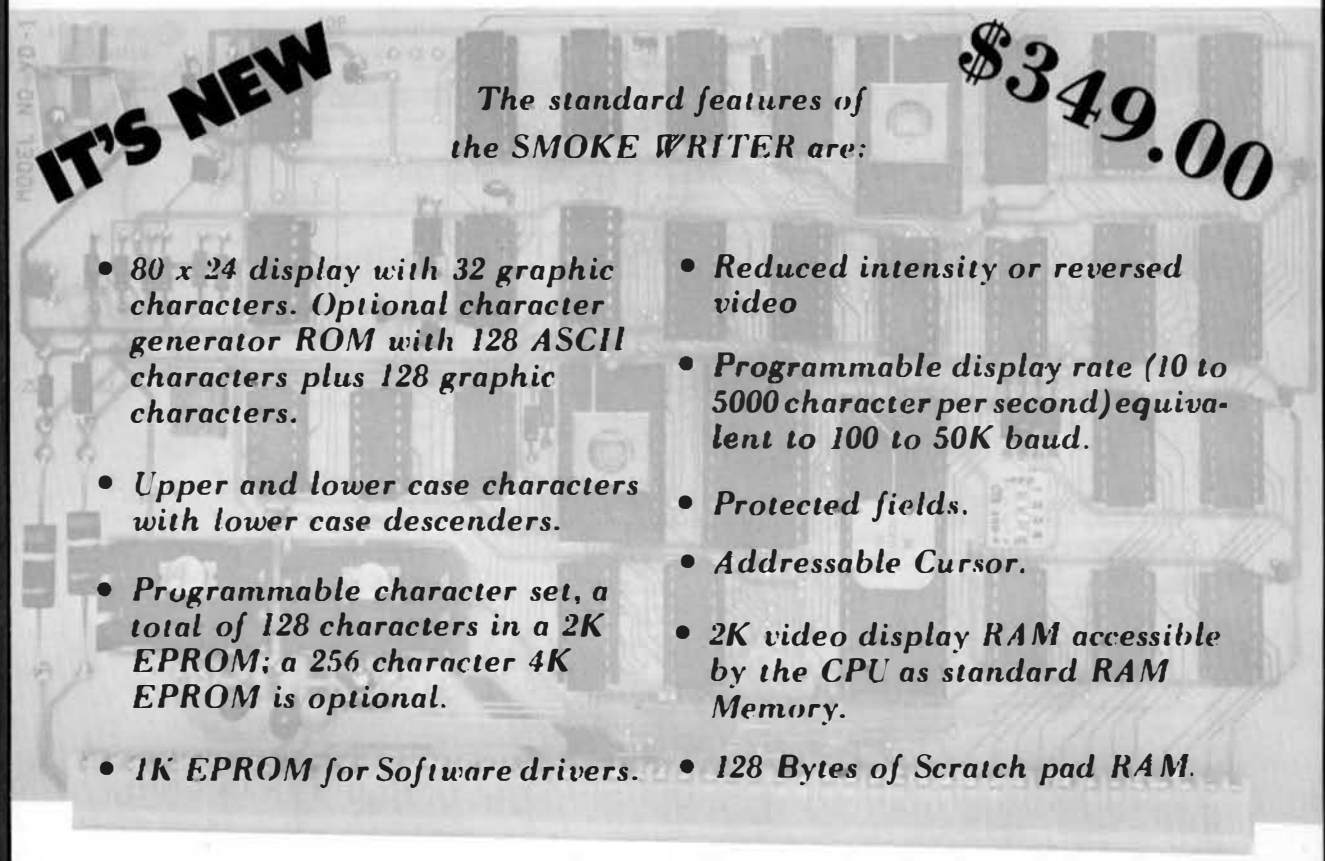

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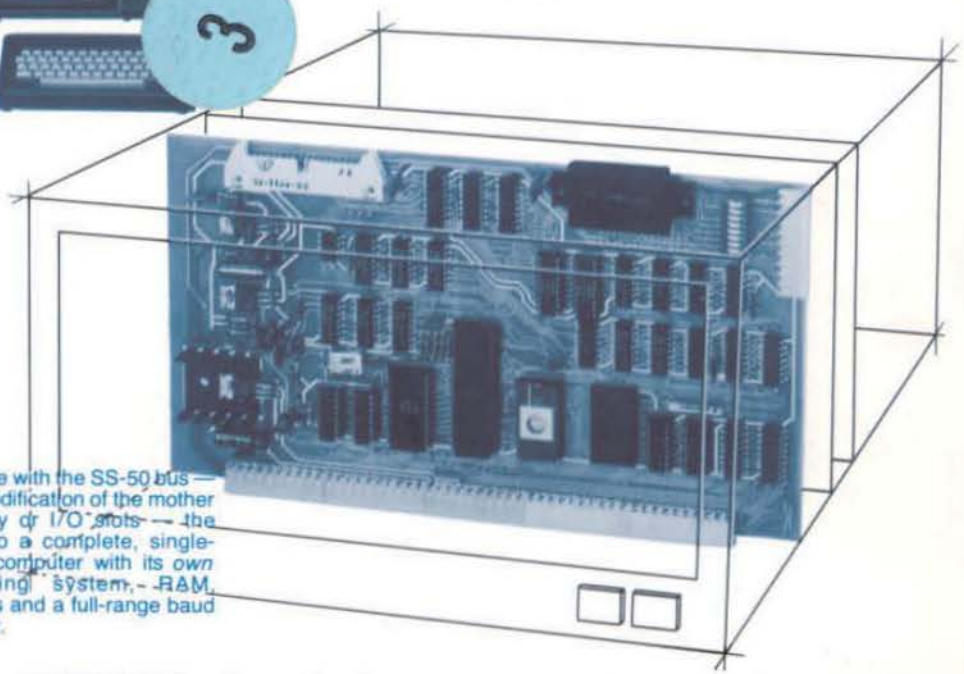

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